DOCUMENT RESUME

ED 476 905 CE 085 013

AUTHOR	Booth, Robin; Clayton, Berwyn; Hartcher, Robert; Hungar, Susan; Hyde, Patricia; Wilson, Penny
TITLE	The Development of Quality Online Assessment in Vocational Education and Training. Volume 1 [and] Volume 2.
INSTITUTION	National Centre for Vocational Education Research, Leabrook (Australia).
ISBN	ISBN-1-74096-154-4
PUB DATE	2003-05-00
NOTE	127p.; An initiative of the Australian Flexible Learning Framework for the National Vocational Education and Training System 2000-2004.
AVAILABLE FROM	National Centre for Vocational Education Research, 252 Kensington Road, Leabrook, South Australia 5068, Australia (Volume 1; Cat. no. 961; $34.65 Australian). Tel: 08 8333 8400; Fax: 08 8331 9211; e-mail: vet_req@ncver.edu.au; Web site: http://www.ncver.edu.au. For full text (Volume 1): http://www.ncver.edu.au/research/proj/nr1F02_1.pdf. For full text (Volume 2): http://www.ncver.edu.au/research/proj/nr1F02_2.pdf.
PUB TYPE	Reports - Descriptive (141) -- Reports - Research (143)
EDRS PRICE	EDRS Price MF01 Plus Postage. PC Not Available from EDRS
DESCRIPTORS	*Alternative Assessment; Competency Based Education; *Computer Assisted Testing; Evaluation Methods; Foreign Countries; *Online Courses; *Online Systems; Peer Evaluation; Performance Based Assessment; Postsecondary Education; Secondary Education; Self Evaluation (Groups); Self Evaluation (Individuals); *Student Evaluation; Systems Approach; Teacher Student Relationship; Test Construction; *Vocational Education; Web Based Instruction
IDENTIFIERS	*Australia; Electronic Learning

ABSTRACT

The use and potential of online assessment in Australia's vocational education and training (VET) sector was examined. The pertinent literature was reviewed, and 41 Australian and international online designers were interviewed. The following issues in achieving quality online assessment were identified: (1) using the online environment to expand learning and assessment possibilities through self-assessment, peer assessment, and group/collaborative assessment; (2) measuring the quality of online interactions/contributions between learners and between learners and teachers; (3) creating methods to ensure that online assessments yield evidence relevant to the skills being assessed and are valid and authentic; (4) assessing learner readiness for online learning and assessment; (5) time and resource management for online assessors; (6) providing online support for online assessors; and (7) ensuring authentic learner performance by controlling cheating. The following were among the 17 key points for assessment in online learning in VET that emerged from the study: (1) plan upfront how candidates will demonstrate their competence; (2) make assessment part of the online learning process; (3) believe that simple technology can be as effective as complex technology; (4) explore the possibilities of blended delivery and assessment methods; and (5) use the online environment to review, compare, and evaluate assessors' assessment strategies. (Fourteen tables and 111 references are included in Volume 1. Volume 2 contains these

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appendices: Names and addresses of the project reference group; the 10 interview questions; seven fictional scenarios developed to illustrate ways to incorporate online assessment into VET courses delivered online and face to face; screens from the original website; and a list of interview respondents.) (MN)

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The development of quality online assessment in vocational education and training

Volume I

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NCVER

The development of quality online assessment in vocational education and training

Volume 1

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Australian *Flexible* Learning Framework
Supporting Flexible Learning Opportunities

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Publisher's note

This report has been organised into two volumes. The detailed report of the project is contained in volume 1 while volume 2 which contains the appendices appears on the National Centre for Vocational Education Research's website http://www.ncver.edu.au

Background

In August 1999, the Australian National Training Authority chief executive officers endorsed the *Australian Flexible Learning Framework for the National Vocational Education and Training System 2000–2004*. The Australian Flexible Learning Framework has been developed by the Flexible Learning Advisory Group and represents a strategic plan for the five-year national project allocation for flexible learning. It is designed to support both accelerated take-up of flexible learning modes and to position Australian vocational education and training as a world leader in applying new technologies to vocational education products and services.

An initiative of the Australian Flexible Learning Framework for the National Vocational Education and Training System 2000–2004

Managed by the Flexible Learning Advisory Group on behalf of the Commonwealth, all states and territories in conjunction with ANTA.

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ISBN 1 74096 154 4 print edition
ISBN 1 74096 155 2 web edition

TD/TNC 73.290

Published by NCVER
ABN 87 007 967 311

252 Kensington Road, Leabrook, SA 5068
PO Box 115, Kensington Park, SA 5068, Australia
www.ncver.edu.au

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Acknowledgements

The researchers wish to acknowledge the contributions made to this study by a diverse range of online practitioners, designers and developers from the vocational education and training (VET) and university sectors, both nationally and internationally. In particular the researchers acknowledge the contributions made by the interview respondents in this study and members of the project reference group (see *Developing quality online assessment in vocational education and training: Volume 2*, which can be found on the NCVER website http://www.ncver.edu.au).

1 Executive summary

Introduction

The use of online technology for learning and assessment in the vocational and other education sectors is increasing. However, online assessment raises many challenges for the vocational education and training (VET) sector, particularly because of the specific requirements of a competency-based assessment system driven by industry standards.

The view has been expressed that there has been little use of the 'online' medium to construct reliable, evidence-based final assessments. Given the growth of interest in online course development, it is essential for practitioners to have access to information about the design and conduct of quality online assessment to expand their repertoire.

The research questions

This study investigated the use and potential of online assessment with the aim of identifying:

- What are the principles of quality assessment in an online learning environment?
- What assessment purposes can be supported through the use of online technologies?
- What assessment methods and/or tools work well in an online learning and assessment environment?
- What factors influence the choice and design of online assessment methods (for example, learner characteristics)?
- What are the challenges, barriers and possible pitfalls in achieving quality online assessment?

The research approach

The study drew on literature and interviews with Australian and international online designers and deliverers from the VET and university sectors. Interviews were conducted with 41 respondents to identify the key issues encompassed by the research questions. A project website was developed to assist communication with respondents. From the literature and interviews, issues were identified which, when solved, would expand the potential for quality assessment in the online environment. These issues have been explored and possible solutions identified. Finally, specific scenarios were developed for application to the VET context which highlight how the issues can be dealt with in this specific context.

The assessment context

There are different demands and emphases in delivery and assessment in the education sectors included in this study. The need in the VET sector for the demonstration of competence against industry standards focusses on assessment which collects evidence of competence across skill areas. On the other hand, the traditional emphasis in the university sector is on the assessment of the body of knowledge which underpins the discipline area. Nevertheless, the lessons learned from the experience of those in different education sectors can be instructive in solving issues and problems and expanding the potential of the use of the online environment for assessment.

The factors that define quality in assessment in VET have been identified in the Australian Quality Training Framework. These standards must be applied to any mode of delivery and assessment. While the online environment offers great potential for the development of a range of assessment activities, research indicates that a 'blended' delivery strategy (involving a mix of online and face-to-face learning and assessment) is generally favoured by experienced designers and deliverers. Consequently, it may not always be appropriate to conduct all assessment activity online. It is important therefore, that assessment strategies are carefully planned from the outset.

Before examining the assessment process in isolation, it must also be acknowledged that assessment is an integral part of the whole learning process. By investigating online assessment separately from the broader learning process, there is a risk that the issues involved in the design and conduct of assessment become isolated and thus distorted.

The principles of quality assessment

Principles of quality assessment are the same for online as they are in any form of delivery. These principles, set out in the Australia Quality Training Framework (ANTA 2001), include the need for assessment to be valid, reliable, fair and flexible. Assessment design also needs to be conducted in consultation with industry bodies. The online environment with its use of technology adds a layer of complexity and exaggerates the difficulties and issues associated with assessment in the VET sector generally.

Assessment purposes

The study and the literature suggest that no single assessment activity is necessarily more 'achievable' than another. This project found examples of all types of assessment; however, it was apparent that there is a greater degree of both experience and confidence in the use of online technology for formative assessment activity; that is, assessment which is comprised of assessment events which contribute to an overall 'mark'.

In some cases respondents did not discuss formative assessment separately but as part of the overall learning strategies. The place of formative assessment is critical in the learning process and is accentuated in flexible and online learning arrangements. In these delivery contexts assessment needs to be structured and consciously designed into the learning process. In the face-to-face learning environment formative assessment can be included intuitively by the teacher.

Assessment methods and tools

Interviews for this study revealed that a range of methods are being used for online assessment activity. However, respondents identified that a wider range of possibilities are still to be explored. These methods tend to be in the areas of self and group assessment, using chat and bulletin boards, and group and collaborative approaches. In assessing skills, greater use of simulation and project-based assessment could expand the potential range of methods, providing evidence from 'authentic' environments.

The potential of the online environment to support a student- or learner-centred approach is identified by a number of respondents in the study. The assessment methods that could be further expanded are those where the learner is central to the learning process. These methods include self-assessment and project-based assessment.

Considerations for online assessment design

The choice and design of online assessment methods are influenced by the learners' needs, their access to technology, the available resources, and to some extent, the discipline or industry area. It is important to examine what is to be learned and assessed to identify appropriate methods to demonstrate these skills. In most situations it is also important to use a range of methods to collect critical evidence to ensure valid assessment.

Issues in achieving quality online assessment

Issues identified from the literature and respondents fell broadly into pedagogical and technological areas. Technological issues, such as access to appropriate technology and sufficient bandwidth, were considered beyond the scope of this project.

The issues selected for further development were:

- using the online environment to expand the learning and assessment possibilities through self-assessment, peer assessment and group/collaborative assessment
- measuring the quality of online interactions/contributions between learners and between learners and teachers
- creating methods to ensure assessments done online yield evidence that is relevant to the skills being assessed and indisputedly from the learner; that is, assessments that are valid and authentic
- assessing learner readiness for online learning and assessment
- time and resource management for online assessors
- providing online support for online assessors
- cheating—ensuring authentic learner performance.

As well, experts consulted for this study were asked for their predictions about the future of online assessment. Advances in information and communication technology will change the face of delivery of learning programs, leading to more sophisticated diagnostic and self-assessment tools and the development of customised learning programs based on an assessment of specific learners' needs. Standardised large-scale tests will provide solutions to time and consistency issues. For the VET sector, online technologies will play a stronger role in the assessment and recognition of current competence.

2 Introduction

Background

Flexible delivery of vocational education and training (VET) is a key priority of this sector in Australia. The Australian National Training Authority (ANTA) has demonstrated the importance it places on flexible delivery with its support of projects under the auspices of the Australian Flexible Learning Framework. This project is one of these initiatives. Online delivery is seen as one of the major ways training can be delivered more flexibly.

The Australian VET sector has seen a rapid increase in the number of training programs delivered online in the last five years. While considerable resources have been allocated to the development of distance and online learning courses, as well as instructional materials and learner resources, there has been less attention given to the complex issues associated with assessment practice in an online learning environment. Information currently available to designers emphasises the development of instructional materials and the technological aspects of program development.

With the implementation of training packages there has been a refocus on various aspects of competency-based assessment. Issues of validity and consistency in assessment generally are the focal points of recently funded research (Thomson, Sanders & Foyster 2001) and resource development (Department of Education, Training and Youth Affairs 2001a, 2001b, 2001c, 2001d). While these projects focus attention on the quality of VET assessment practices generally and recognise its importance for effective practice of mutual recognition, little specific attention has been paid to the quality of online assessment approaches, although there is widespread concern about this issue.

The issues paper written for the ANTA National Flexible Delivery Task Force in 1996 noted that as flexible delivery approaches and settings become more varied, there is a concomitant requirement for enhanced flexibility in assessment methods to match the needs of new environments and diverse clients (ANTA 1996). The ANTA Toolbox website provides advice for online assessment developers:

> Online assessment is underpinned by the same principles, uses many of the same strategies and methods for collecting and evaluating evidence and is designed in the same way as other assessment processes. The difference is the context of the assessment and the different types of interactions that will occur between the assessor and those being assessed. [ANTA n.d.]

Views expressed in the literature about the quality of online assessment in education suggest that the scope and variety of assessment has generally been disappointingly limited. Yet the information and communication technologies available allow for a wider range of assessment methods, many of which are not currently adopted by the VET sector.

Harper et al. (2000) in their review of research into the current state of online delivery, not only in the Australian VET sector but also in the higher education sector, refer to the 'embryonic' nature of online delivery and the need to remain open to a range of different strategies while 'realistic strategic, pedagogical and commercial models are developed' (Harper et al. 2000, p.iv).

Given the current state of online course development in the VET sector, it seems essential for practitioners to have access to more comprehensive information about different forms of online assessment which would enable them to expand their current repertoire. A broader range of online assessment practices could be usefully adapted for VET, keeping in mind critical factors such as competency-based assessment principles and the specific assessment requirements of training packages.

University sector providers have a strong tradition of researching and reporting on educational change and innovation. Lessons learned about online assessment in this sector and other non-VET sectors can be shared and used to support the development of quality online learning and assessment in VET.

Project aims

This project aimed to examine a range of online assessment practices in both the vocational and other educational sectors, to determine the range of methods used, the reasons for selecting particular assessment approaches, issues raised about assessment online and the possibilities for adaptation of those approaches by the Australian VET sector. In order to develop a community of knowledge, the project sought input from a wide range of sources, including national and international designers and experienced online educators in the field.

The research questions

The research asked the questions:

- What are the principles of quality assessment in an online learning environment?
- What assessment purposes can be supported through the use of online technologies?
- What assessment methods and/or tools work well in an online learning and assessment environment?
- What factors influence the choice and design of online assessment methods (for example, learner characteristics)?
- What are the challenges, barriers and possible pitfalls in achieving quality online assessment?

3 Methodology

Qualitative research methods were used in undertaking this study. Following the initial literature review, data collection was conducted over two stages. Key informants were primarily those who had published in this area along with experienced VET providers in online learning. The first stage involved interviews with designers and deliverers to identify issues. The second stage involved further 'interviews' to develop solutions. The data were then used to develop 'fictional' assessment scenarios for the Australian VET online environment.

Literature review

Very little literature which focusses specifically on assessment in an online environment is either published or available in relation to the Australian VET sector. Much of what may be happening in the Australian VET sector is still experimental, not documented publicly or accessible only to online provider staff and learners enrolled in the course. The review therefore drew substantially on the established body of literature in the higher education sectors and international sources. In order to capture data in this developing field, the literature review continued during the life of the project.

Interviews with online designers and deliverers

To identify the key issues the researchers conducted interviews with a range of designers and deliverers from both the VET and non-VET sectors.

Potential participants for the data collection were identified from a range of sources including:

- authors of articles and texts sourced from the literature review
- personal contacts with recognised experience in the subject area (both VET and higher education), gained through previous projects in the field
- presenters at professional association and educational media conferences
- national VET initiatives (including Learnscope projects and the Flexible Learning Leader program)
- related National Centre for Vocational Education Research (NCVER) research studies
- the project's reference committee.

These sources were considered by the researchers to provide an appropriate and credible way of identifying and selecting designers and deliverers who had an established reputation or expertise in the online delivery and assessment field.

Using this approach, a database of 106 potential participants was established, representing public and private sector institutions in Australia. International contacts were emailed and invited to participate in the project. Forty-five responses were received and 41 were finally interviewed. The majority of local respondents were interviewed by phone, while email was used for international respondents. Respondents were also asked to provide information about their level of experience in the field. The majority of those interviewed reported three or more years' experience of delivery or design in the online and computer-assisted assessment environment.

Respondents received a set of open-ended questions based on the project research questions (appendix 1 in volume 2). Data from the interviews were coded and collated for analysis and are presented in the relevant sections of the report.

Interview participant profile

Thirty-four respondents were from Australia and seven from overseas locations. Interview respondent details are summarised in tables 1 and 2.

Where responses from interviews or email correspondence have been used for the report, the respondents are not specifically identified but their area of work is given.

Table 1: Respondents' education sector

Education sector	No.
University	20
TAFE/public sector	12
Private VET	5
Enterprise VET registered training organisation	3
Community VET	1
Total respondents	**41**

Table 2: Respondents' main job role

Role or function	No.
Deliverer	17
Instructional designer	5
Designer/deliverer	9
Manager	10
Total	**41**

Respondents' discipline area

University respondents to the survey represented a wide range of discipline areas, including medicine, law, business, biological sciences, pathology, information technology, teacher education and political science. VET sector respondents were from community services, business, safety, finance, information technology, telecommunications, hospitality and professional development for teachers. The range of courses in which respondents are involved varied from Australian Qualifications Framework certificate II to postgraduate masters programs.

Issues for further exploration

From the results of the literature review and the interviews, nine issue areas were identified for further exploration. Specific respondents with identified expertise or interest were invited to reply to provide commentary or solutions to one of the issues. These experienced practitioners were also directed to the project's 'quality online assessment' website so that they could comment on any of the other identified issues. The results of this process were compiled as commentary and solutions to the issues identified.

Solutions—application to the VET context

A series of specific 'fictional' assessment scenarios were developed with direct application to the Australian VET context. These scenarios were written to highlight how solutions (derived from a variety of online education and training contexts) might be generated for Australian VET practitioners. These scenarios are included as appendix 3.

Project website

A website, <http://www.veac.org.au/QualityOnlineAssessment/qualityindex.htm>, was developed to promote the research project as well as to provide an online forum for practitioners to respond to the issues raised during the research.

The site allowed for communication with the wider assessment community by promoting the project to potential participants, posing issues for further discussion and providing links to resources identified during the life of the project. This means of data collection was an additional and more informal strategy to pilot a range of 'online' communications and data collection methods. Some observations and additional data were gathered from this source. An example of the website homepage is included as appendix 4.

Structure of the report

This report has been organised into two volumes. The detailed report of the project is contained in volume 1 while volume 2 which contains the appendices appears on the National Centre for Vocational Education Research's website <http://www.ncver.edu.au>.

In volume 1 the results of the research gathered both from the literature and respondents have been presented under each of the research questions in chapters 5, 6, 7 and 8 of the report.

Chapter 9 gives an account of issues identified from the literature and interviews and is accompanied by specific commentary. Chapter 10 discusses solutions provided again from both the literature and from experienced designers and practitioners. The sections are designed to be able to be read independently to answer specific questions. A summary of the key points in online assessment is provided.

Chapter 11 outlines some of the potential future developments for the use of technologies in assessment practice.

4 The assessment context

Before considering the research questions on assessment in online learning, aspects of the assessment context need to be explored and clarified. The issues to be clarified include:

- assessment in the university sector and in the VET sector
- the concept of quality in assessment
- the development of online learning and assessment
- the quality of assessment in the current online learning context.

Assessment in university sector and in VET

The literature on assessment in the online learning environment generally, and the application of quality assessment principles to the online learning environment specifically, is extensive. Although most published work in the area of online assessment to date has emanated from the university sector rather than from the VET sector, it is nevertheless useful to draw on the knowledge and experience contained within the latter. While application of this experience can be instructive, differences in assessment requirements for the two sectors need to be taken into account.

The university sector focusses mainly on the development and assessment, often norm-referenced, of cognitive skills, with little emphasis in terms of summative assessment, on psychomotor or affective aspects of learning (summative assessment being that taken at the end of a course or period of instruction). Bloom's taxonomy of educational objectives (from Athanasou 1997, p.15) is a common reference point used to identify the cognitive skills developed in university courses:

Table 3: Bloom's taxonomy of educational objectives

Cognitive objectives	Psychomotor objectives	Affective objectives
Knowledge	Perception	Receiving
Comprehension	Set	Attending
Application	Guided response	Responding
Analysis	Adaptation	Valuing
Synthesis	Origination	Organisation
Evaluation		Characterisation

Source: Athanasou (1997, p.15)

McAlpine and Higgison (2000), Miller et al. (1998) and Peat (2000) are among the authors who refer to Bloom's taxonomy within the context of online delivery in the university sector.

Although Bloom's taxonomy is acknowledged as providing the definitive list of educational objectives (see for example Athanasou 1997; Hagar, Athanasou & Gonczi 1994), the VET sector relies for its theoretical framework for assessment practice on a distinct body of work centred on the notion of criterion-referenced and competency-based assessment (CBA).

In the VET sector competency standards are determined by industry. The aim of assessment is to gather sufficient evidence to determine competence against the workplace competency standards. The standards and units of competence form the basis of the national training packages developed by the relevant industry.

The concept of knowledge in the VET sector is understood to comprise all of the cognitive skills included in Bloom's taxonomy, although different cognitive skills are required at different levels of achievement within an occupation or job classification. For example, certificate level I knowledge and skills would mainly involve memorisation and recall, while diploma level skills would require a range of high-level cognitive skills, including analysis and synthesis of ideas (Australian Qualifications Framework Advisory Board 1998).

Likewise, the concept of the skills developed and assessed in the VET sector could be seen as reflecting the psychomotor domain of Bloom's taxonomy, but the VET sector has identified a specific range of skills that are used at higher levels. These higher-level skills include:

> - contingency management skills (responding to problems, breakdowns and changes in routine)
> - job/role environmental skills (dealing with leadership responsibilities and expectations of the workplace)
> - transfer of knowledge and skills to new situations.
>
> (Department of Education, Training and Youth Affairs 2001a, p.1)

The concept of attitudes in the VET sector could be seen as reflecting the affective domain in Bloom's taxonomy. Athanasou (1997) provides examples of attitudes for lower-level courses:

> ... standard of service in hospitality; depth of rapport in child care; quality of patient contact in nurses aides; sensitivity of client service in welfare; or appropriateness of customer service in sales. (Athanasou 1997, p.14)

Generally speaking the VET sector delivers training within the Australian Qualifications Framework levels 1–6. The higher-order skills and knowledge assessed by universities in the online assessment approaches may not be relevant to the VET sector.

The concept of quality in assessment

There is a wealth of both historic and recent literature exploring and analysing the development of assessment in education and training, particularly competency-based assessment (Gillis & Bateman 1999, which refers to authors such as Glaser 1981; Griffin & Nix 1991; Messick 1992; Gonczi et al. 1993; Clayton 1995; Griffin & Gillis 1997; Athanasou 1997. Thomson, Saunders & Foyster 2001, makes reference to Cropley, 1955; Ebel 1965; Messick 1989; National Training Board 1992; Hager, Athanasou & Gonczi 1994; Toohey 1995; Nitko 1996). This body of work is assumed knowledge and not explored further here.

While there have been recent attempts to stimulate debate about standards of assessment quality in the Australian university sector, the approach to assessment and its quality is very much the domain of the individual institution. For the VET sector the concept of quality in assessment has been very precisely defined through the development of national policy and standards (ANTA 2001). Organisations that wish to award credentials from national training packages must be registered training organisations (RTOs) and meet the standards of the Australian Quality Training Framework (AQTF). This framework sets out the standards, and therefore the benchmarks of quality, for all aspects of training and assessment (ANTA 2001). Assessment in any learning mode (face-to-face, distance, online) must be developed in line with these standards.

Standards 8 and 9 of the Australian Quality Training Framework refer specifically to assessment. These standards define the components of 'quality' in assessment in VET. Apart from meeting the four principles of assessment—validity, reliability, flexibility and fairness—the framework also highlights requirements such as assessment information to candidates; standards of performance required in the workplace; sufficiency of evidence; provision of feedback to candidates; equitable assessment processes and language, literacy and numeracy considerations in assessment (ANTA 2001).

The Australian Quality Training Framework also makes some specific references to online assessment:

> … where assessment or training is conducted online or by distance, the RTO [registered training organisation] [must have] … effective strategies for learner support, monitoring and assessment.
>
> The RTO must have access to the staff, facilities, equipment, training and assessment materials required to provide the training and/or assessment services within its scope of registration and scale of operations, to accommodate client numbers, client needs, delivery methods and assessment requirements (including off-campus and online). (ANTA 2001, p.20)

There is an extensive body of work discussing validity, reliability, flexibility and fairness within the context of competency-based assessment. Thomson, Saunders and Foyster (2001) consider that validity is the most important technical principal underlying assessment, and that with a broad enough view of validity, then reliability, fairness and flexibility can be subsumed within it. Validity is defined as: 'the extent to which the interpretation and use of an assessment outcome can be supported by evidence' (Thomson, Saunders & Foyster 2001, p.10).

Gillis and Bateman (1999) also use the evidence-based definition of validity in their examination of validity and reliability of assessment in the VET sector. They provide useful tools for VET assessors to develop valid and reliable assessment events.

Authors of current work in the area of competency-based assessment are in agreement about the importance of validity and reliability, as well as flexibility and fairness, in developing quality competency-based assessment activities. The challenge for online developers is how to incorporate these principles of quality assessment into the context of online assessment.

Assessment as part of learning

There is a danger in focussing research on assessment specifically, as this tends to isolate the assessment process from teaching and learning in general. However, it is critical that, while we examine the quality of the planning, development and conduct of assessment and apply this to the peculiarities of the online environment, assessment is ultimately viewed as part of the learning process. Assessment should provide the necessary feedback to the learner to assist them to monitor and evaluate their learning.

As Kendle and Northcote (2000) assert, assessment should be one of the first design considerations when preparing an online course and be integrated into the course, not tacked on as an afterthought.

The development of online learning and assessment

In order to investigate assessment in an online learning environment, it is helpful to define the parameters of online learning. Brennan, McFadden and Law (2001) suggest that 'there is a lack of rigour about the definitional base which underpins the term 'online delivery'' (p.13). They adopt the University of Illinois definition that identifies three broad categories:

- where computers support teaching and learning
- where there is a mixture of computer support and online delivery
- where computer technology alone delivers education and training.

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Brennan, McFadden and Law (2001) consider online learning/delivery to be computer technology which enhances, extends and replaces traditional teaching and training practices, and they list the tools that could be included as digital video disks, WEB TV, voice recognition systems, video and video synthesis, streaming audio and video as well as chat, email and extensive use of the internet.

An important qualification to make to this definition is that there is some interactivity between learners and teachers/assessor. For the purpose of this study we are not including situations where the learner simply downloads material from a CD-ROM or website or uses email to send assessment activities, but rather where there is some degree of interaction through the online medium.

In the vocational education context assessment is 'the process of collecting evidence and making judgements on whether competency has been achieved to confirm that an individual can perform to the standard expected in the workplace as expressed in the relevant industry/enterprise competency standards' (Department of Education, Training and Youth Affairs 2001a, p.169).

The process of assessment in an online learning environment will use forms of the technology listed above to collect evidence of competence.

The potential of the online environment

The literature on online learning abounds with discussions on the opportunities for innovative learning experiences made possible by technology. The literature also emphasises the value of basing learning experiences on learner-centred pedagogies (Byers 2002). However, the use of traditional pedagogy in designing web-based learning and assessment activities has been much lamented in the literature on online learning in Australia (for example Brown & Drinkwater 2001; Edmonds 1999; Jasinski 1998; Ryan 2000; O'Reilly & Patterson 1998).

It is worth noting that several of these commentaries noting the lack of innovation in online teaching and learning were made in the late 1990s. The current literature indicates that many online learning developers are now using learner-centred and constructivist pedagogy as the starting point for the design of online teaching and learning activities. Constructivist pedagogy or learning is where learning is seen as an active process, with learners constructing new ideas and concepts based on current or previous knowledge. Assessment, as an integral component of the learning process, will naturally benefit from shifts in overall course design and pedagogical orientation.

It should also be noted however, that there are few examples of fully online courses (Hill 2002). While there is great potential in the medium, it is clear that it will not replace other teaching and learning approaches. Experienced online designers and deliverers are quick to support this. Consequently it may not always be appropriate to assess online learning with online assessment.

The quality of assessment in the current online context

Interview respondents for this research received a set of 'discussion starters', brief quotes from the literature focussing on different perspectives about assessment and learning online, and were asked to comment on an excerpt from a presentation given by Yoni Ryan at an Australian Universities Teaching Committee Forum:

> My preliminary searches for good examples of online assessment reveal no mainstream examples of the potential of the new media to construct authentic, valid and meaningful evaluation of the range of student learning.
>
> Instead at least at this stage I have found a trivialisation of content knowledge, diminished to the level of True/False answers, Matching exercises, Multiple choice questions of the lowest common denominator level which undermines the very learning that we now all agree is essential for our students. (Ryan 2000)

Achieving the most effective and pedagogically sound use of the communication and information technologies for assessment purposes is the challenge confronting designers and developers. Opinions about this quote were divided.

A number of respondents agreed with the sentiments expressed in the quote, voicing opinions that higher-order skill levels were difficult to assess using current tools, that there was a potential for practitioners to be seduced by the tools at the expense of the pedagogy, particularly as learning platforms tend to build assessment tools using tasks of the nature referred to by Ryan, and that it was early days in relation to innovation in assessment.

One respondent offered the view that:

> Computer-based assessment which relies on multiple-choice questions can tend to be simplistic, but probably has a useful place in testing content knowledge and skills, although unlikely to be helpful in developing higher-order skills.

Strong views were also expressed that the comment was now 'outdated' and that developments in technology and educational practice had moved on since then. In disagreeing with Ryan's comments one respondent stated the view:

> I would suggest that it is more to do with the design of the assessment ... I think the criticisms of online against face-to-face need to be reconsidered ...

This comment was supported by another suggesting:

> Well I guess that in many respects you get what you deserve. If you ask trivial questions then that is what you will get as responses.

These comments highlight the need to explore the capacity of the online environment to develop assessment that meets the requirements of the Australian VET sector.

5 Principles of quality online assessment

What the literature says

As the take-up and interest in online learning have increased, the issues surrounding assessment in this environment have gained more attention. A number of authors have specifically addressed principles or guidelines for online assessment design and development (Hayes 1999; Kibby 1999; Kendle & Northcote 2000; McLoughlin & Luca 2000; Rowlands 2001; Kemshal-Bell, 2001; Graham et al. 2001). All of the authors referenced for this section write from the perspective of the university education sector, with the exception of Rowlands (2001) and Kemshal-Bell (2001) who have drawn on both the Australian VET and university sectors for findings.

Hayes provides a list of expectations for online assessment and states that assessment should:

- be clearly related to the aims and objectives of the subject
- occur at integrated moments along the learning continuum
- embody students utilising authentic, real life skills and processes
- include provision of proactive skills support if required, and
- allow for students to make choices and be informed of their learning progress.

(Hayes 1999)

Kibby (1999) provides a comprehensive set of key questions that need to be addressed when planning effective assessment, whether online or offline. Kibby explores the advantages and disadvantages of online assessment and suggests that just because a course is delivered online does not automatically mean that assessment is also online. However, Kibby states that: '[when developing] a subject that is delivered or supported via the Internet, then the possible role of the Internet in the assessment process should be considered at every step' (1999).

Kendle and Northcote's original ten criteria to guide the design and development of effective qualitative online assessment tasks (2000) have been refined to a set of six criteria. The criteria are listed below with a paraphrased explanation following each criteria:

- *variety:* including both quantitative and qualitative methods
- *authenticity:* using open-ended tasks that simulate workplace tasks, as well as appropriate quantitative tasks
- *collaboration:* allowing for interaction between learners and others, and using appropriate communication technologies
- *feedback:* ensuring appropriate feedback mechanisms are possible using peer feedback and peer tutoring
- *online resources:* making full use of available quantitative packages as well as other internet resources
- *learner responsibility:* providing options and opportunities for accountability within assessment tasks.

Rowlands suggests the use of a set of interrogation benchmarks for evaluating online assessment:

- Are assessments authentic, based on real life applications?
- Are assessment items flexible, and are multiple forms of assessment possible?
- Are students allowed to present evidence of knowledge and skill that is meaningful to them and unique to their learning preferences?
- Is the assessment introduced before or simultaneously with content material?
- Is assessment continuous?
- Is self-assessment or peer assessment available? (Rowlands 2001, p.54)

In their evaluation of four professional online courses, Graham et al. (2001), used Chickering and Gamson's 'Seven principles for good practice in undergraduate education' (Chickering & Gamson 1987 cited in Graham et al. 2001) to develop a 'list of lessons' learned for the online learning context.

Two areas highlighted in their research relate to the design of discussion assignments and the provision of feedback to learners. The researchers suggest that simply requiring learners' 'participation' in an asynchronous discussion is not enough. Without learner engagement in a meaningful task which engages the learner with the content and produces a product, provision of feedback on the discussions and criteria established for the assessment of the quality of postings, discussions may be shallow.

Graham et al. (2001) identify the need for two types of feedback in the online environment—information feedback and acknowledgement feedback. The former relates specifically to the comments made by the teacher on the learner's performance or in response to a specific request. The latter confirms that an event has occurred (for example, an email has been received and read, or an assignment has been received.

Guidelines for the development of online assessment strategies alone will not be sufficient to ensure quality assessment. Kemshal-Bell's recent study (2001) details the technical, management and facilitation skill sets required by teachers to deliver online training effectively. Similar skill sets would be required by those involved with online assessment.

Learner satisfaction with assessment processes

After a review of the literature on quality assurance of online assessment, McLoughlin and Luca (2000) conclude that a quality assessment process has to take into account learner satisfaction with the process. They state that this concept is rarely taken into account when designing authentic and valid assessments.

McLouglin and Luca discuss the idea that web-based learning provides the opportunity to reconceptualise curriculum and to implement a learner-centred and performance-based pedagogical paradigm. They note that 'online communication tools, shared workspaces and asynchronous dialogue make networked learning and assessment [such as peer assessment] feasible'. They argue that using the world wide web and other forms of technology have both contributed to, and accelerated the move toward authentic and performance-based assessment. They also make the prediction that the concern for quality in online assessment will lead the university sector to mirror the VET sector in its focus on the use of competency standards in assessment. They suggest that the future might involve the development of 'benchmarking procedures ... to compare learner performance to exit level or industry standards'.

What is clear from these writers is that the principles for quality assessment in the online environment differ very little from quality principles for either classroom or workplace-based assessment. Validity, reliability, flexibility and fairness are still paramount in the online environment as elsewhere. The significant difference for online assessment lies in the use of information and communication technologies. There is a need to ensure that these technologies enhance, rather than impede, quality in assessment practice.

What the interview respondents said

The interview respondents were asked to indicate what they saw as the principles of quality online assessment and the extent to which these might be different to those for 'face-to-face' assessment. Responses were wide-ranging and are summarised in table 4.

Table 4: Interview responses to principles for quality online assessment

Assessment principle nominated by respondents	No. of times mentioned
Valid, reliable, fair	23
Authentic	9
Consistent	8
Provided by skilled teachers trained in online assessment techniques	7
Learner-centred	3
Plagiarism-free	3
Without compromise on quality	3
Where learnerss have easy access to computer equipment	3
Part of quality improvement process	2
Contextualised	2
Part of a blended solution (some online/offline)	2
Where screens have been well designed	2
Integrated with learning	1

Frequent reference was made for the need for assessment to be valid and reliable, to reflect real-world application and to be aligned to the learning outcomes.

Some respondents specifically indicated that the extra time and effort that goes into online assessment items improves the quality of the assessment process.

Are the principles the same regardless of the assessment context?

Yes: Overall, the interview respondents indicated that the principles for quality online assessment were the same as those for assessment in any delivery mode.

No: For the small number of respondents who suggested that the principles for assessment in online environments were different from those required in a face-to-face environment, a number of comments were offered. These were primarily concerned with the dimension which the technical considerations might bring to the online assessment. One respondent suggested that they were different because:

> Tests have to be checked not just for the content (as a written exam) but also for their technical suitability

Other comments were:

> Yes they differ. All the principles of good assessment (reliability, validity, alignment with learning aims)—combined with the ease and reliability in the software and hardware of the communication system being used.
>
> Yes they are. Accessibility issues, screen design ... you're using a machine that is an information tool (think what does ICT [information and communication technology] mean) and trying to lock it down to a secure test taking environment. Cache issues, cross-platform

> support, cross-browser support, plug-in support, client preferences and settings, security and authentication, invigilation, lab design …

The doubts seemed to relate more to the application of the principles in the online environment. However, as two respondents suggested, the spotlight was, in all probability, a little unfairly focussed on the online assessment:

> You'll probably find that there are aspects of the traditional [assessment system] that have been accepted for years, and are inappropriate or could be vastly improved …

> We are asking more from online assessment than face to face …

In summary

Both the literature and the interview responses confirm that the principles for quality online assessment are the same regardless of the delivery mode. In other words, validity, reliability, fairness and flexibility are the key measures for quality assessment. The views expressed by some respondents that the technology used in online assessment adds another dimension to the assessment process and differentiates online assessment from other more traditional forms of assessment are important. However, these differences are best seen as the 'additional' complexities that using technology-enhanced learning and assessment systems bring to the design process, rather than a difference in principles.

There is a growing body of literature relating to the provision of guidelines about assessment in the online environment. Rather than produce guidelines and principles specific to the online environment, there is perhaps a need to contextualise the principles to the changing assessment environments, in much the same way as tips and guides were developed when workplace-based assessment in the vocational education sector was introduced.

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6 Assessment purposes

What the literature says

The range of assessment purposes

The literature identifies three common types of assessment in the context of institution-based learning: diagnostic, formative and summative (Rumsey 1994; Athanasou 1997; Miller, Imrie & Cox 1998; Morgan & O'Reilly 1999; Slay 2001). Formative and summative may be combined in the process of continuous assessment (Miller 1998, Morgan & O'Reilly 1999).

In addition to assessment activity during and at the end of a learning course, assessment may also occur prior to the delivery of the learning course. Pre-course or training assessment may be used for:

- the recognition of a learner's current skills and knowledge
- diagnostic testing for course placement purposes
- the identification of learning needs for course design.

(Miller, Imrie & Cox 1998, NSW Department of Education and Training 2001)

Pre-course assessment is of particular importance to the VET sector because of the Australian Quality Training Framework requirement for candidates to have access to a recognition process on enrolment (ANTA 2001, p.18).

When planning assessment in any context, it is critical to consider the purpose of the assessment. Selected examples of online assessment in the areas of formative assessment and summative assessment, recognition and identification of learning needs assessment are explored in the project.

Examples of recognition assessments

A number of institutions from both the university sector and VET sectors in Australia and overseas are offering online recognition processes as part of the course assessment. These organisations provide opportunities for online assessment of prior learning and/or current competencies. In general, the organisations rely on the presentation of evidence for assessment.

Institutions offering online recognition include Box Hill TAFE in Victoria <www.bhtafe.edu.au/rpl> and Canadian universities in British Columbia <http://www.c2t2.ca/abt/>. An Australian VET site, <http://www.westone.wa.gov.au> assists with online recognition assessments for a variety of registered training organisations.

The development of affective skills is of particular interest to workplace managers and supervisors. Human resources units in various workplaces use a range of computerised or online techniques to assess affective skills. For example, the human resource practice of '360-degree profiling' involves questioning representatives from all relevant sections within an organisation to determine individual employees' proficiency in a range of skills. This kind of profiling can be fully supported by computers or online media through questionnaire distribution, completion of the test online, automated scoring and the provision of feedback to the person being assessed (see <http://www.hr-survey.com/360Feedback.htm>).

Discussion of a range of assessments is available online through human resource organisations. These tests can assess affective skills as well as cognitive skills. Examples include pre-employment tests, memory tests, vocabulary tests, cognitive ability tests, information processing tests, personality tests (see <http://www.hr-guide.com>).

Some organisations provide an online benchmarking service of self-assessments for companies that want to compare themselves with other companies in particular skill or resource areas. These benchmarking assessments include affective skills within the range of areas that are benchmarked (see <http://www.vpmep.org/assessments.htm>).

Examples of diagnostic/placement assessments

Online assessments currently in use may provide models for the development of pre-learning assessments. The field of computer adaptive testing holds great potential for the development of diagnostic/placement tests. The Educational Testing Service website includes a computer-based version of the 'Test of English as a foreign language', an entrance test for overseas learners wishing to enter university sector institutions in the United States. The computer-based version adapts the test questions to the level of the learner. The responses to previous questions determine the subsequent questions. (For the Educational Testing Service see <http://www.toefl.org>.)

The website of the American Society for Clinical Pathology outlines the use of a computer adaptive test by its Board of Registry for registration. According to the website, 'each examinee is administered a tailored test, specifically designed for their individual ability level' (see <http://www.ascp.org/bor/directors/exam_dev/computer.asp>). It is not clear what the outcomes are for examinees with different results and ability levels, but it is clear that such individualised testing could be of great use in designing pre-learning assessments linked to appropriate remediation regimes.

Examples of learning needs assessment

Taylor (1998) reports on the use of Self Test, a flexible self-assessment package for distance and other learners. Self Test assesses skills in mathematics for learners wishing to undertake engineering courses at university level. The test results are linked to units of study to assist learners to update their skills and knowledge and to prepare for and/or identify appropriate further study.

Other examples of online assessment of learning needs were not able to be located as part of this literature review. Often these assessment activities are only available to enrolled students. However, this is an area where further online resource development would be useful, not only in terms of assessing learning needs, but also in the development of online resources to address identified learning support needs for individual learners.

Formative and summative assessment

Formative assessment is an essential part of the learning process, as is the provision of feedback to the learner about their progress. Several studies from the literature provide examples of continuous assessment and other combinations of formative and summative assessment.

The online environment allows for considerable exploration of a variety of formative assessment techniques and strategies. Online designers suggest that the key difference between fully face-to-face and fully online delivery is the inclusion of adequate formative assessment strategies built into the learning process. As the teacher is not necessarily available to provide feedback to the learner, formative assessment strategies allow the learner to gather feedback and guidance at a time convenient to them.

Summative assessment in the online environment for the VET sector presents a challenge to designers as demonstration of competence is required. Developments in the use of simulations and problem-based learning are assisting this process. However, integration of online assessment with hands-on assessment, together with the collection of evidence from the workplace will continue to be the most effective assessment strategy. The literature provides many instructive examples of formative and summative online assessment. It is difficult to discuss these assessment uses in isolation as many online education and training programs blend both formative and summative assessment. The discussion on formative and summative online assessment has been combined for greater coherence.

Online formative and summative assessments described in the literature range from objective tests, one correct answer per question, to open-ended project-based activities.

Examples

Maor (1998) describes and analyses an example of formative assessment used with high school mathematics and science teachers from around Australia via an online 'activity room'. The online activity room was set up to facilitate both peer and lecturer feedback as a component of formative assessment. The course also allowed for a summative self-assessment component. The issues raised by Maor included:

- how to assess student participation, particularly in terms of the quality of the contribution
- the difficulty in getting learners communicating initially and on a regular basis
- the time consuming nature of providing regular and timely feedback from the instructor
- how to create and keep realistic boundaries on the amount of material placed in the activity room for students to read/interact with. (Maor 1998, pp.4–7)

Despite these difficulties, Maor (1998) found learners to be overwhelmingly supportive of the activity room and its provision of course materials and learner–learner and learner–teacher interaction.

Sly and Rennie (1999) describe the use of practice tests for formative assessment via a computer-managed learning system at Curtin University of Technology. The system supports formative and summative assessment in a variety of disciplines, including accounting, economics and psychology. The system creates randomly generated tests using item banks and sets of parameters established by instructors. According to Sly and Rennie: 'While the system is capable of supporting a variety of question types, multiple-choice questions are used almost exclusively' (Sly & Rennie 1999).

Sly and Rennie (1999) report on the use of computer-managed learning for both formative and summative assessment. They compare the performance of learners on summative tests based on whether or not they made use of the opportunity for practice tests (formative assessment). Interestingly, their analysis of results indicates the greater value in undertaking formative assessment: allowing learners to reflect on, and improve their learning experiences, rather than just gaining greater familiarity with the test format.

Bostock (2000) provides some background on peer assessment and both formative and summative computer-assisted assessment. He describes one online course that used formative and summative multiple-choice tests. Two other courses cited used practical assessment events such as web-based projects which were peer-reviewed both formatively and summatively.

Bowie et al. (2000) discuss the use of online course portfolios for assessment and learning. They survey the literature on the use of electronic portfolios and identify the unique features of their project. The main feature noted was the high visibility to the entire learning community of the developing portfolios, and the resultant ability of the learning community to make quantum leaps in their learning.

Peat (2000) discusses the use of self-assessment modules that provide a comprehensive formative assessment process in first year biology courses at the University of Sydney.

Velan and Kumar (2000) discuss online formative assessments used in the Faculty of Medicine at the University of New South Wales. These formative assessments provide immediate, automated, individualised feedback. Links provide information to learners on their strengths and weaknesses, followed by strategies for redressing these weaknesses. In the same article, Velan and Kumar also describe a project-based summative assessment activity that involves a hospital case study which allows learners to demonstrate critical thinking skills and the ability to synthesise information. Integrity of the assessment is assured as the assessment self-renews annually. Previous reports are unable to be used in subsequent years. In addition, no two learners are allowed to submit reports on the same case.

Woodbury, Roberts and Shannon (2000) discuss the use of the vGallery, which allows both formative and summative assessment as well as peer and self-assessment.

Baggott and Rayne (2001) used frequent formative and summative computer-based assessment events for adult learners. They provided extensive feedback to learners after formative assessment events. Some of the summative assessment events were 'open-book' while the final was 'closed-book'.

Behncke and McNaught (2001) describe the Anatomy Online course offered at the Royal Melbourne Institute of Technology. The course uses the Learning Hub environment developed at the institute to provide the opportunity for self-directed learning. The Learning Hub focusses on formative assessment through objective (multiple-choice, true/false, ordering, matching, fill-in-the-blank and short-answer) assessment events that have in-built feedback processes. The learners value the immediate feedback provided on their progress and the opportunity to understand teacher expectations of their learning. Teachers benefit from reduced marking duties and the fact that the assessments are managed by the computer system.

Brown and Drinkwater (2001), and Chambers (2001) discuss problem-based learning approaches to online learning and assessment. Bucolo, Hayes and Foss (2001) describe the production of an e-journal that incorporates both formative and summative activities.

These examples indicate that there is great scope for effective formative and summative assessment to occur online. Recent developments in the assessment of problem-based learning, the use of electronic portfolios and the web-based products such as e-journals and vGallery confirm that objective tests are not the only form of assessment that can be used online. VET sector teachers and trainers can feel confident that it is possible to assess competence online. However, activities that aim to summatively assess competence must be carefully planned, designed and conducted so as to ensure validity, reliability, integrity and equity.

What the interview respondents said

Interview respondents were asked to comment on the types of assessment purpose which can best be supported through online assessment activity. This question was asked in order to determine if the online environment was more suitable or appropriate for any one of the three common assessment purposes referred to in the assessment literature: diagnostic, formative and summative assessment.

Interview respondents tended to either answer the question directly or by discussing their current practice. They also offered their views on the potential for online assessment. There was frequent mention of the capacity for formative assessment to be achieved through online assessment. There were a range of ways in which the technology could support ongoing assessment of learner progress.

Interestingly, when some people described their current use of online activities they did not necessarily view the activity as 'assessment' per se. It was so integrally linked to the learning process that they saw it as 'the learning'. For some of these respondents, the term 'assessment' appeared to be only used for the 'formal' assessment processes involving specific assessment events which would be used to report on performance or learning outcomes.

In summary

As the examples provided in the literature suggest, there is considerable scope for the achievement of formative and summative assessment activity online. This potential for effective online formative and summative assessment was also reflected in many of the examples provided during the interviews.

However, it was clear from many of the examples and the comments made by interview respondents that online summative activity was usually only one component of a range of evidence used by assessors.

The study and the literature suggest that no one form of assessment is necessarily more 'achievable' than another in an online environment. The study found examples of all forms of assessment; however, it was apparent there is a greater degree of both experience and confidence in using formative assessment in the online environment.

7 Online assessment methods and technologies

What the literature says

A survey of online assessment items conducted by O'Reilly and Patterson (1998) revealed that 'the scope and variety of assessments has generally been disappointingly limited' and yet the medium of online delivery itself allows for a wide range of assessment methods, many of which are not currently being adopted by the VET sector. Research into online learning conducted by Jasinski (1998) also indicated limited use of the technologies for assessment purposes. In their review of VET online learning, Harper et al. (2000) record similar findings, with technology for assessment often confined to emailing assignments.

During a forum discussion on assessment issues among participants at the Net•Working 2000 Conference, there was agreement that a limited range of assessment tasks is currently being used by VET providers online. There was also agreement that there is a range of competencies that cannot be assessed effectively and validly through interactive online learningware. Many VET practitioners delivering online are using the medium effectively for formative assessment, but for online summative assessment methods they are relying on a limited range of more select-and-response types of assessment where there is only one correct answer (such as multiple-choice questions). These types of online assessment tasks are used in combination with more traditional assessment at the institution or workplace.

The literature, particularly that from the university sectors in Australia and internationally, has, over the last three years, begun to identify the possibilities and potential for a range of ways in which the technologies can support and deliver assessment for a range of learning and assessment purposes (Kibby 1999; Leask 1999; Slay 2001; Herrington et al. 2000; Kendle & Northcote 2000; Rowlands 2001).

Despite differences in context and content, VET practitioners can learn from the implementation of online assessment strategies in other education sectors.

Web-based assessment, according to Kibby (1999) can assist learners to take ownership of their learning. Herrington et al. (2000) suggest that, for the online environment to provide 'integrated and authentic assessment of student learning', students need the opportunity to craft 'polished performances or products in collaboration with others'.

Kendle and Northcote (2000) challenge online course developers to incorporate a broader, more diverse range of assessment methods to better cater for the 'differences and complexities found within any modern challenging curriculum'. They examine the scope of the online environment for task design and cite as highly useful:

> ... the ease of using collaborative tasks in an equitable manner, including mentoring, feedback to and from students and teachers, support and encouragement, ability to see examples of other students work, and the use of peer assessment. (Kendle & Northcote 2000, p.536)

Taylor and Maor (2000) also recognise that the new technology offers unique prospects for promoting reflective and collaborative learning and assessment.

Table 5 synthesises the potential identified in the literature for the use of technologies for a variety of assessment purposes and methods. This list is by no means exhaustive. As developers become more adept at innovation online, more interactive possibilities and integrated strategies will emerge.

Table 5: Technologies and assessment types

Online discussion	Discussion or participation in online conferences take place in chat rooms and through threaded discussion. Facilitators can monitor contributions by learners as a component of the class assessment.
Bulletin boards	Topics can be placed on bulletin boards as the starting point for online collaborative assignments. Learner work, with prior consent, can be posted on bulletin boards for peer assessment, review and comment.
Collaborative assignments	Learners use online resources to work collaboratively on an assignment or project. An added benefit of this technique is the development of communication and team-building skills valued by employers.
Self-assessment	Learners can use online quizzes to help them assess their own needs and direct them to further areas of study.
Online exams	These can be moderated and controlled with start and stop times
Online quizzes	Instant online feedback is given to learners through questionnaires and multiple-choice questions. Regular quizzes are completed online for a small component of final assessment. Quizzes can be used formatively during the course ensuring sufficient skills and knowledge have been attained before attempting a final assessment.
Computer-marked assignments	These can be in the form of multiple-choice tests as a quick and easy indicator of progress to both learner and facilitator. Further developments are examining the use of automated marking for essays and reports.
Portfolios	Portfolios are developed using a variety of online tools or computer software products. Facilitators have easy access to learner products and performances. By keeping track of early efforts, learners and teachers can monitor gains in knowledge, competence or other outcomes.
Role play	This medium can offer the learners a degree of anonymity which allows them to express themselves more openly than they might otherwise. Learners can take on a role which they can research. They can speak and act in character allowing more freedom of expression.
Simulations	These are of particular interest where there is an aspect of safety involved. Students learning to fly large jets, implement large networked accounting systems, or repair and service lifts and escalators might all benefit from a simulation.
Email	Email is used to submit reports, assignments and essays. Work is returned by email with annotations or, with learner permission, results can be placed on bulletin boards.
Web publication	Learners can write and publish articles and assignments in web-based publications allowing for peer and faculty review.
Web design and development	In information technology courses, learners can complete tasks that contribute to the design and development of their own website. The completed product is also part of the learner's portfolio of work for future employers to view.

What the interview respondents said

What online assessment methods do you use?

Respondents commented that one of the most common uses of the electronic environment for assessment was the use of email for the submission of assignments and portfolios. However, of more interest to the study were the ways in which a number of the participants were using and experimenting with the interactive and collaborative features of the technology for assessment purposes. Email submission of assignments, while clearly seen as a convenient and quick way to deal with the traditional written forms of assessments, such as essays and written assignments, was not considered a 'form' of online assessment by the researchers.

Multiple-choice questions and short-answer responses were used extensively for formative assessment purposes and in some cases summative. Speed of feedback and the role these activities played in formative assessment were frequently mentioned reasons for their use.

Some respondents reported activities which integrated learning and assessment through online collaborative and discussion activities, using communication tools such as discussion boards. Examples of some of the assessment approaches and methods used by respondents are described at the end of this section.

Summaries of the responses to the questions about current and best uses for online assessment are provided in table 6.

Table 6: Online assessment method used by respondents

Type of assessment method	No. of times mentioned
Email submission of essay / portfolio	26
Multiple-choice, true/false	23
Short-answer responses	20
Chat room	12
Bulletin board/threaded discussion	6
Simulation	2
Self-assessment	3

What learning platforms and tools are you using?

A variety of tools were used to deliver and support online assessment tasks. Table 7 summarises responses provided by Australian respondents.

Table 7: Online assessment tool in use by Australian respondents

Learning platforms and tools	No. of times mentioned
WebCT	8
Janison Toolbox	7
In-house products	7
Blackboard	4
Question mark perception	3
Learnfast (Monash)	1
Web MCQ	1
Lotus learning space	1
Testpilot	1
Total	**31**

What types of assessment are best used in an online environment?

The literature suggests a wide range of possibilities and benefits for the use of information communication technologies for assessment purposes.(Hayes 1999; Kibby 1999; Leask 1999; Morgan & O'Reilly 1999; Slay 2001; Herrington et al. 2000; Kendle & Northcote 2000; McAlpine & Higgison 2000; Rowlands 2001; McLoughlin & Luca 2001; O'Leary 2002). A growing body of literature discusses the potential for large-scale testing activity using computerised and adaptive assessment activities provided it is cost-effective and efficient (Dalziel & Gazzard 1999; Bennett 1999; Pollock, Whittington & Doughty 2000, Bejar et al. 2001; Burstein, Leacock & Swartz 2001).

The interview responses confirmed the ongoing interest in the use of computerised response-type assessment methods involving multiple-choice questions, matching and selecting activities. Some saw these as best used to assess knowledge and specific content areas; others suggested that there was further potential for more sophisticated use of the response-type question to integrate a range of problem-solving and content knowledge skills.

Others saw the online communication between learners as the most important aspect of the online learning environment.

One of the respondents suggested that:

> It depends entirely on the discipline, the type of online assessment, the availability of support and the level of interest by the tutor. Computer assisted assessment is very useful for formative assessment and feedback. You can deliver small chunks, it's quick for the student to do, there is immediate and non-judgemental feedback with possibly the option of repeating until success is achieved.

The capacity to assess collaboratively in a team was given support by a number of respondents.

Simulation as well as the use of bulletin boards was regarded very highly for interactive assessment.

Interestingly, a much wider range of online methods was suggested than those respondents stated they currently use.

Table 8: Types of assessment best used in an online environment

Type of assessment	No. of times mentioned
Multiple-choice questions	12
Short-answer quiz	14
Formative assessment activity	9
Simulation	8
Discussion/bulletin boards	9
Online collaboration	6
Email submission	6
Knowledge checking	3
Reflection journals	2
Projects	1
Email games	1

Examples of approaches to assessment

Example 1: Engaging learners in the assessment process—self and peer assessment in an Australian university

For the learning and assessment activity of a particular unit, learners are given authentic problems for which they have to write a solution in portable document format (PDF). Learners have to post their solutions, along with a self-assessment mark, by a specific date and time.

The assessment system then randomly allocates three learner teams to assess each solution. Learners are given a specific time within which they have to read the solutions, provide comments and assess. Tutors then assess the solutions.

This approach provides a multi-dimensional situation in which learners can see the problem, view the solutions and all of the assessments/comments given by themselves, peers and tutors. The benefits of such an assessment approach is that it allows learners to see the work of others, see how others are assessed, to look at how and what feedback is provided, and to see comments from a range of different sources and perspectives.

The commitment of time by the tutor to an assessment activity of this nature is significant and may be more demanding than traditional assessment procedures.

Example 2: Using simulation for assessment in an Australian university

A course in Middle Eastern politics is the focus of a simulation activity conducted online with groups of learners over a six-week period. In a joint learning activity, learners from an Australian university and an American university participate in a simulation/role-playing activity. The context is the volatile and ever-changing political environment of the Middle East, involving current major stakeholders, globally and locally.

Once learners are assigned a role, they have to research their role, gather evidence and start to 'play' by posting material, debating issues and arguing a perspective. None of this could be achieved without the research involved in the task. All roles have to be represented in the debate and everyone has to contribute. The program was also conducted successfully with another Australian university's engineering students. The benefits from this 'collaboration' across faculties was the specific expertise each group brought to the experience. Both groups had to consider the perspective of the other group—one group had a more technical basis and understanding, the other came from a political background.

An evaluation of the program indicated two key factors which impacted on the quality of the outcomes for learners. These factors were:

- ◇ The simulation activity was the correct length.
- ◇ The assessment activity engaged the learners to a high degree.

The evaluator commented that the length of the simulation activity was important for the motivational issues associated with the online environment. She also commented that many of the learners became 'addicted' to the learning/assessment activities.

Example 3: Integrating online discussion with assessment in an open university

The online tutor uses online discussions for summative assessment purposes. Learners are expected to participate in these discussions and collaborative activities planned by the tutor. These online discussions and collaborations are then used as a resource when learners complete the more traditional essay-type assignments. In this way the online learning activity is incorporated into the assessment activity, in much the same way as a learner might use the literature or papers discussed in a face-to-face session.

At least 25% of the marks for the assessment are awarded for drawing on the discussions which arise out of the online activities. If the learner doesn't participate, they have difficulty completing the assignment. The assignments are submitted, marked and returned via an electronic system.

In another course the same tutor uses the discussion board to allow learners to post drafts of their work for comment prior to final submission. These are on view to the other learners who also have the opportunity to provide feedback.

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Example 4: Creating authentic assessments—Australian VET providers

One VET informant suggests that the graphical interface holds a range of possibilities for more authentic or work-related aspects of assessment activity. The use of visual representations increases both the learner engagement with the assessment activity and their motivation.

In an occupational health and safety module within a fashion course the 'online' assessment activity involves learners viewing a simulated workplace environment (for example a machine cutter in a workroom). Learners are set tasks to identify the potential occupational health and safety hazards they discover through viewing the video clip/picture.

An Australian emergency service organisation which has all of its learning material online includes assessment where learners sequence their responses to certain emergency scenarios. They include short-answer responses, giving their rationale for the choices they make. The organisation is in the process of developing more sophisticated learning and assessment activities using more developed graphical interfaces. This will allow them to replicate emergency situations and assess responses in particular scenarios.

Example 5: Using online assessment for recognising skills by an Australian VET provider

The online assessment activity in the information technology course offered by a large organisation serves a number of assessment purposes for the provider. One which is of great benefit for the learners is the 'recognition' of current knowledge/skills. The organisation has seen the opportunity to use assessment activities to assist learners to identify their own skill or knowledge level prior to enrolling in a particular module.

Example 6: Using select-type questions for assessing higher-order skills in an Australian university

Supporting the potential of multiple-choice questions and ordering/sequencing activities to assess higher-order skills, one respondent discussed an example in which problem-solving skills are assessed. Medical students had to select from 30 possible responses in relation to a medical situation and then prioritise the order in which decisions would need to be made to support the selected outcome. Highlighted by this example is the range of skills required in order to arrive at a solution: recalling knowledge, reflecting and analysing information, predicting and evaluating. The design of the task involves a series of stages in which the learning and the assessment are integrated, with responses in one stage having consequences for the next.

Example 7: Compiling portfolios for assessment in a European and a New Zealand university

For one of the tutors interviewed in the study, a collaborative approach to learning is the key to the design of online learning and assessment activity.

The tutor uses one of the major learning platforms to support his approach to assessment. This platform provides the facility for learners to create teaching and learning portfolios. As the learners are engaged in a collaborative learning activity, they post their portfolio resources over a period of time and all the learners can see how their portfolios are built up.

The lecturer in a New Zealand university's teacher training course sees the online technology she uses as part of her classroom. The course uses a software program called ClassForum which is based on Web-Crossing and has been modified to meet the teaching and learning requirements.

Within each class the lecturer has established a folder called 'portfolios' where she is able to review and evaluate the portfolios of all learners. She places all the module responses provided by learners, her feedback, comments and grades in the portfolios. Learners can easily access their assessment and lecturer comments.

This approach to monitoring and maintaining an assessment system has benefits for the learners and the lecturer. It has eliminated the need for email or attached documents which were too time-consuming.

Example 8: Developing authentic and simulated assessment environments in an Australian university

An undergraduate course in soil science (agriculture degree) successfully uses an online simulation to assess learners' ability to consider and evaluate all the factors they need to consider when replicating the complexity of a real-life situation. The visual and graphical interface allows a three-dimensional depiction of the soil study site and enables them to depict the site and explore without actually being on site.

The tutor sets up a range of possible scenarios from which learners select factors and combine these to assess predicting skills.

Example 9: Implementing problem-based online learning and assessment in Australian and Canadian medical programs

An online learning program for doctors uses a problem-based approach. The approach involves posing questions for a case study and using a discussion board to post learner responses. Interaction between learners and the facilitator is a feature of the approach, and it works well as an alternative or adjunct to face-to-face tutorials.

Learners respond to a series of questions about a specific case and post their responses to an online forum, where they can also view and comment on the responses of their peers.

Following this stage a 'content expert' in the field (for example, paediatrician) has a week to comment on all of the responses. The expert is working from assessment criteria which have also been provided to the learners, so that they know on what basis assessment decisions are made.

Because the expert has time to consider the students' responses and all the factors involved in the learners' 'solutions', the lecturer considers this is, in some ways, a better approach to a valid assessment outcome for this particular context. In a face-to-face situation these responses may be less 'considered' because of the time constraints and larger learner numbers. The approach is well suited to small groups of 6–10. Using this approach with larger groups would be problematic because of the resourcing issues and time involved.

In a similar program, problem-based learning is used in the first two years of the course, with the online environment as an adjunct. Learners meet face to face and are given the problem. They are subsequently exposed to resources, readings and materials via the website during their exploration of the problem.

Through this approach learners are assessed not only on the knowledge/content issues, but also on the process—the way in which they research, gather evidence and demonstrate how they arrive at their conclusions.

An important benefit for both learners and the tutors in this approach is the time built in for reflection. It is also an approach which supports peer commentary. The learning and assessment activity is extended by other learners' posting solutions and comments.

In summary

The literature and a number of the examples discussed in the interviews support the fact that educational objectives clearly linked to assessment activities underpin the more effective use of online assessment methods.

Good examples in both the literature and our study reveal the importance of identifying early in the online learning design process what is going to be assessed and how learning and assessment will be integrated. The selection of tools or technology will then be based on an informed educational decision rather than on an attraction to the particular ease of an assessment method or tool.

It is clear that select-and-supply-type computerised assessment tools have a role to play in various assessment contexts and for various assessment purposes. Instantaneous feedback to learners, enhanced by well-designed learning loops, opportunities for multiple attempts as well as a reduction in a 'marking' load, are all important benefits of computerised assessment activities, providing scope for both formative and summative assessment—although the use of the latter is still an area of considerable debate.

Multiple-choice questions, while often associated with simple recall of facts, can, with careful thought, wording and design, test higher-order skills (application, analysis, synthesis and evaluation). As the range of question types and their interfaces supported by the software tools expands, the possibilities for greater variety and creativity in assessment design becomes apparent.

Importantly, the literature and the examples cited in this study highlight the potential for collaborative and online learning communities in open, distance and flexible learning arrangements. Learner-centred assessment approaches, which include peer and self-assessment, create further opportunities for the development and assessment of higher-order skills.

The use of discussion boards for both learning and assessment purposes will continue to grow as all stakeholders become more comfortable with the medium. With the creation of portfolios of evidence, assessment as a much more integrated and transparent process can be supported by the new technologies, developing assessment criteria available to all and generating opportunities for a greater role for learners themselves in the assessment process.

8 Choosing the design approaches

What the literature says

The literature discusses a range of factors and considerations which are important for the design of online learning and assessment. Learner needs, learner backgrounds, learners' computer and technology skills and the nature of the discipline area are some of these factors. These are discussed in the following section.

The needs of learners

The special needs of learners should be considered when designing online learning and also assessment. This includes learners from backgrounds where equity is a consideration, with different levels of experience with computers as well as a range of learning styles.

For all learners, individual learner differences are a major consideration in teaching and learning. Current theories of human learning emphasise the primacy of the individual learner in the learning process. These theories point to the need for individuals to construct meaning and understanding for themselves from the learning experiences they undertake. The development of learner-centred approaches to teaching and learning has resulted in the role of the teacher being redefined as that of a facilitator of the individual's learning.

Within a learner-centred learning paradigm, all teaching, learning and assessment should be tailored to the needs of individual learners. In practice, this ideal is often not realised. Learning and assessment events are often designed around the curriculum developer's concept of the 'average' learner. Alexander and Blight (1996) provide a 'good practice model for technology in education'. This model supports the design of learning experiences, including assessment, that 'use the most appropriate technology in the particular learning context to provide the best possible learning experience for a particular group of learners engaged in learning particular content' (Alexander & Blight 1996).

The model covers the context and content of learning, information technology issues, and teaching/learning (including assessment) design issues. The model would be a useful starting point for online education and training designers who want to ensure that the needs of individual learners are addressed.

Learners from equity backgrounds

Zammit, Meiers and Frigo (1999) discuss the special provisions that can be made for assessments, particularly standardised assessments, to support the learning of people with specific educational needs, such as Indigenous learners, those where English is a second or later language and learners with disabilities and learning difficulties. Although these provisions are appropriate to the learner sitting an in-class test or exam, further provisions are appropriate to the online medium. These include:

- ensuring that the test is scheduled to include extra time
- allowing learners to point to the answer in the case of multiple-choice questions
- creating special scoring rubrics that take into account the learners' linguistic and/or cultural background.

The issue of gender differences in online communication has been examined in some depth. Cook, Leathwood and Oriogun (2001) discuss the work of other researchers (Hall 1994; Herrington 1996; Stewart et al. 1999) in identifying the gender differences and online communication. This research has noted that women tend to post messages less often than men and also tend to post shorter messages than men (Cook, Leathwood & Oriogun 2001), although this perspective is refuted by other research. Online course and assessment designers need to be aware of possible differences and consider using assessment criteria that do not involve numbers or length of postings. Other useful strategies would be those that encourage familiarisation with the medium early on and motivate women in particular, to post more often.

Harper et al. (2000) quote several authors (Bellman et al. 1993; Harasim 1993; Ruberg, Taylor & Moore 1996) as having shown that online learning environments facilitate 'participation for mature-aged, female and handicapped learners' (Harper et al. 2000, p.40). Harper et al. also cite the findings of Agostino, Lefoe and Hedberg (1997) that online learning environments support learners from language backgrounds other than English (Harper et al. 2000, p.40).

The online environment can offer a much richer opportunity for interaction to learners with characteristics that prevent them from interacting in face-to-face situations. Baggott and Rayne (2001) found that continuous, frequent assessment (both formative and summative) contributed to significant improvements in the performance of learners from language backgrounds other than English.

Dede and Kremer (1999) noted how learners who did not participate in classroom interactions often became much more prolific in their participation when using a virtual medium. Dede and Kremer reported that learners who were more 'passive' in class often 'found their voice' when they accessed one or more of the virtual media used in a course on instructional design using interactive multimedia. The authors suggest that the 'passive' learners in classroom situations may be 'shy, prefer time to reflect before answering, or feel at a disadvantage because of gender, race, physical appearance, disabilities or a lack of linguistic fluency' (Dede & Kremer 1999, p.4).

Harper et al. (2000) also noted that authors such as Bellman, Tindimubona and Arias Jr (1993), Goddard (1996), Harasim (1993) and Ruberg, Taylor and Moore (1996) have found 'that learners who tend to participate less frequently in face-to-face, classroom situations contribute much more [in] online learning situations' (Harper et al. 2000, p.40).

Level of experience with computers

The majority of sources that discuss the experiences of learners in online learning point to the need to address learners' lack of self-confidence and experience with online learning. Ryan (2000) refers to the need for:

> … a high degree of student comfort and skills with the online environment. All the surveys, from the large McInnes, James and Hartley study of first years, to the institution specific studies such as QUT's Technological Literacy project (Rossiter and Watters) to the unit specific studies done by Ron Oliver at Edith Cowan and by my students and myself, reveal neither comfort nor skill are widely spread, in either school leaver or mature age populations. (Ryan 2000)

In examining a number of case studies using new assessment methods in online learning, McAlpine and Higgison (2000) found that, in order to effectively engage and retain learners in the programs, online learning/assessment developers used techniques such as introductory ice-breaker activities, scaffolding and adequate learner support services (McAlpine & Higgison 2000).

Kulp (2000 cited by McAlpine & Higgison 2000) discusses the need for a highly structured approach to assist learners to gain skills which will help them succeed in the online environment.

Zariski and Styles (2000) found that older learners, particularly those with workplace experience of computers, 'tended to feel more competent with and adjusted to online learning even if it was a new experience for them' (Zariski & Styles 2000).

Learning to learn/learning style factors

McLoughlin and Marshall (2000) discuss the importance of developing skills in learning how to learn, specifically in the online environment. In particular they highlight the need for learners to be able to articulate their thoughts, develop a range of learning strategies, self-regulate their learning activities and self-evaluate their skills and learning.

They also provide specific examples of how the online environment can be designed to engage and motivate Indigenous learners and to reflect contexts and learning strategies that are relevant to Indigenous learners.

Zariski and Styles (2000) look at the use of a range of learning strategies of learners new to the online learning environment. They suggest that many learners have a 'limited understanding and experience of deep learning strategies' (Zariski & Styles 2000). Creese (2001) examined the use of online assessment for the development of teamwork skills in a technical and further education (TAFE) course. According to Creese, learners need to be computer-literate, have skills in online literacy and discussion and possess time-management and interactive skills.

Learners with other characteristics/attitudes

Janes (2000) discusses the flexibility of assessment deadlines that needed to be provided for an online learning program that was delivered to 'working professionals with other commitments besides this program' (Janes 2000 cited by McAlpine & Higgison 2000). In theory, this flexibility should be provided in any competency-based learning program, but in practice, it may be that deliverers of online learning programs are more willing than their classroom-based counterparts to make such accommodation to the needs of their learners, particularly those learners whose teachers may regard as somewhat similar to themselves.

Else and Hicks (1998), quoted in Brennan, McFadden and Law (2001) examined 'how the possibilities of technology match with the predispositions and life conditions of the intended learner audience' (Brennan, McFadden & Law 2001). Brennan, McFadden and Law (2001) list the 'stumbling blocks' to effective online learning for communities in rural and remote West Australia identified by Else and Hicks, particularly low levels of general and computer literacy and lack of a local tutor or mentor.

Mitchell and Bluer (1996), also quoted in Brennan, McFadden and Law (2001) found that learners were not always convinced that online learning and other educational technologies were of great value in enhancing the learning experience and may have very different attitudes to using online technologies.

According to Jasinski (1998), online learning was most effective where learners were computer-literate and were mature, self-motivated, self-disciplined reflective learners who could deal with technical problems.

The challenge for online learningware developers and deliverers is to develop tools that will identify learning styles and level of readiness for online learning prior to content delivery. Developers and deliverers then need to have a range of learner support mechanisms that can be drawn upon and integrated into courses on a just-in-time basis to suit the various needs of the learner cohort.

Appropriate assessment of different disciplines

The literature reveals that online technologies are delivering and supporting assessment practice in a wide variety of discipline areas. Examples of online assessment for different subject, content and discipline areas are included throughout this report.

However, Kibby (1999) believes 'that there are some forms of assessment for which the Internet is not suitable' (Kibby 1999, p.3). She gives examples in the university assessment context where strictly controlled conditions and examinations support the high degree of security required for the discipline (Kibby 1999).

Athanasou's advice (1997) on the use of different types of assessment techniques for different disciplines can be applied to the online context. For example, he suggests that:

> Short answer questions are appropriate for some learning outcomes more than others. For instance short answer questions are useful for recall of facts, analysis of data, and solving mathematical, economic, scientific or engineering problems. (Athanasou 1997, p.91)

Russell and Butcher (1999) discuss the use of portfolios across a range of discipline areas and with different learner groups. They provide specific examples of the use of portfolios as both formative and summative assessment in two educational technology courses. Many aspects of the portfolio design, production and assessment occurred electronically.

O'Reilly and Patterson (1998) provide a list of case studies that offer innovative online formative and summative assessment activities in discipline areas as diverse as atmospheric science, Middle East politics and nursing.

The Computer Managed Learning (CML) database described by Sly and Rennie (1999) is used in a wide variety of disciplines, including psychology, accounting and management. Velan and Kumar (2000) describe a problem-solving approach to assessment of learners of medicine.

Eger and Vacek (2000 cited by McAlpine & Higgison 2000) discuss the use of online assessment in the context of 'soft sciences' such as economics and management at a university in the Czech Republic. They point out the difficulty of producing assessment activities that can be computer-marked:

> … it is not always easy to design tests based only on yes-no or multiple choice questionnaires, so the involvement of the tutor in the assessment process may be necessary … It may become possible to use expert systems for assessment of solutions of more complicated problems, but at this stage we do not plan their use. (Eger & Vacek 2000 cited by McAlpine & Higgison 2000)

What the interview respondents said

The project sought to identify the factors and considerations which influenced the choice and design of assessment methods for online learning. And while the respondents came from a range of educational and training contexts, the researchers were interested in issues unique to the individual context and the commonalities across sectors and discipline areas.

Some of the factors and considerations discussed in the interviews are outlined below. They ranged from technical and financially based considerations to those of a pedagogical nature. For a number of the respondents, the decisions and considerations had been made at an institutional level and were outside the control of the individual.

A summary of interview responses is provided in table 11 at the end of the chapter.

Flexibility

Interview respondents used the term 'flexibility' in a variety of ways, and it was not always clear whether they were referring directly to the learning arrangement or the assessment component. For many, the learning and assessment were integrated so it was natural for them to consider the online methodology as a whole, rather than its component parts. Flexibility meant reducing the traditional confinements of specific locations and time-driven assessment processes.

On the other hand, some respondents referred to the ways in which learners could choose ways of providing their assessment to suit their preferences:

> I also use a variety of different tools so that students get the chance to express their understanding of a topic in different ways and/or the most appropriate way for them. I ask for up to 50-word responses online, paragraphs, bullet points, poems, audiotapes, videotapes, faxed diagrams PowerPoint presentations, web pages etc.

Feedback

As a number of the interview respondents were involved in using online technologies for a distance education program, the capacity to provide feedback in an effective and 'immediate' way was an important factor and consideration in choosing an assessment method and technology to support it.

Both simple and complex assessment methods supported the feedback processes, ranging from the use of computer-automated marking with feedback loops to the use of tutor/assessor, expert and peer assessment. Many of the assessment activities involved staged processes during which feedback was provided from a variety of perspectives.

Discipline area

Pedagogical considerations highlighted by both the literature and interview respondents include the appropriateness of the specific discipline area to online assessment approaches and the specific approach to assessment in a competency-based system.

An instructional designer for an Australian university's learning and teaching centre suggested that the discipline area or curriculum is an important consideration in the decision to go online with assessment. He suggested that it is mainly the disciplines such as science, economics and marketing which are attracted (at least at his organisation) to using online assessment, because they are areas that have traditionally used such methods as short-answer and multiple-choice questions. He believes that: 'People in the humanities don't think it is appropriate to use online assessment'.

His view is that each discipline needs to be looked at separately in the way it operates and each set of learning outcomes needs to be examined.

The same respondent indicated that an important consideration for online assessment is the need to consider student learning style preferences and the learner's context. This was particularly relevant when designing learning and assessment activities for 'off-shore' overseas students.

Technical capabilities

Some respondents focussed on the technical capabilities of a platform or tool when making decisions about using online assessment tools. One respondent indicated a preference for a program or tools that would allow the teacher to use a number or variety of assessment strategies. Another respondent stated that the decisions about the use of computer-assisted assessment tools were based on three factors: the variety of the question types provided in the program, reliability and the track record of providing product support.

Cost and integrating functionalities

The capacity for easy integration of a range of functionalities in order to exploit the strengths of online learning and assessment fully was an important consideration for another informant because they believe: 'That there are a number of assessments that can be done better online than in a face-to-face environment'.

The cost associated with purchasing appropriate software, programs and skill was identified as a consideration. Inexpensive software programs which support formative assessment are readily available and may be chosen because of financial constraints; however, often these programs are not necessarily robust enough to track, report and audit assessment for summative purposes.

The training manager of a large state-based service organisation identified four key factors influencing the uptake and development of online assessment processes: accessibility, cost, enhanced standardisation and consistency and flexibility. Using web-based learning and assessment tools offered the organisation the potential for efficiencies, reducing costs associated with workplace assessors, providing increased employee access to learning and assessment activity at a time of the learner's own choosing, and potentially reducing the 'lock-step' sequencing of more traditional distance learning modes. Of particular importance was the potential of the computer-assisted assessment tools to support the learning process and deliver formative assessment.

Practical and pedagogical

A mix of practical and pedagogical considerations was an important factor in the decision-making process for one VET provider. They chose computer-assisted assessment instruments which would support 'batch' marking and simple 'scored' exercises for formative assessment purposes, but were still considering how they might combine a range of assessment strategies for summative purposes, particularly because of the skill and performance levels which needed to be observed for the achievement of the VET qualification.

An enterprise-based VET provider indicated that a significant factor in the choice of online assessment was that working in a networked 'online environment' was second nature to a vast number of its employees. Therefore they saw the choice and use of the online assessment as both logical and motivational to the learners.

The capacity to support and deliver formative assessment activity was a significant consideration for a number of the respondents.

Transparent assessment

Another important consideration for one of the respondents (who used self, peer and tutor assessment) was the capacity to make the assessment more transparent to learners and to engage learners more actively in the assessment process. One respondent indicated that his choice of method helps all learners in different classes see how their solutions are viewed by different people.

Benefits of online assessment to the learners

Of additional interest to the project was the extent to which instructors had identified the benefits of online assessment for the learners.

Those aspects most frequently mentioned are collated in table 9.

As might be expected in a sample involving diversity of contexts, the range of responses was extensive. However, a significant proportion of the responses emphasised the benefit of providing fast, instant and effective feedback to learners. For example, when computer-assisted assessment is well designed and integrated with a learning management system, learners can access immediate and 'instant' feedback, have access to multiple attempts, take charge of their own learning and track their own progress.

For distance learners, online assessment has the benefit of allowing learners to undertake assessment activity in their own time, place and when they are ready.

One university instructional designer commented on the way in which time spent online is recognised and rewarded through an online assessment activity. This is linked to the motivational aspects discussed by some respondents.

Two respondents from the VET sector nominated benefits for learners such as:

- flexible arrangements
- motivating
- undertake from the comfort of home
- can take your time
- can do many times until mastered
- allows for self-paced learning and convenience
- can make the assessment more realistic.

Removing the need for fixed delivery dates and locations normally required by pen-and-pencil tests is seen as a benefit, along with the capacity to update and modify assessment activity more easily for example, than a CD-ROM-based assessment regime for example.

Another theme emerging in the responses was the potential benefit of the online assessment approach for collaborating, sharing and learning. This was particularly the case when assessment activity involved collaborating with others and reflecting on others' work:

> Students were able to see solutions to authentic problems from many other students, and also view comments and assessments from a variety of different sources.
>
> Opportunities are so limited for isolated communities … the ability to learn and be assessed online can really make difference.
>
> Online assessment is good for interaction, collaboration and problem-based learning.

Another benefit of online assessment for learners was identified as enabling more authentic assessment.

> … the ability to assess knowledge of safety hazards in the workplace through an online simulation is much more authentic than a pen-and-paper knowledge test …
>
> You can create a 'living assessment' where scenarios can be used to assess a wide variety of skills.

There were a number of responses from business and computing teachers that indicated that online assessment was potentially more authentic as a method, as it provided the opportunity to create real workplace tasks and activity.

> Properly designed online assessments can be more authentic and effective [in this industry] than face-to-face.

Table 9: Benefits of online assessment to the learners

Benefits	No. of times mentioned
Convenience/flexibility/ overcomes distance	33
Provides immediate feedback	23
Allows self-paced/multiple attempts	8
Motivates learners	7
Builds virtual teams	5
Allows for authentic/valid assessment	6
Non threatening/builds confidence	4
Improved communication (teacher–learner)	4
Learners acquire time-management skills	2

Benefits of online assessment to the teachers and assessors

For those respondents who mostly used computer-assisted and automated online assessment activities in the form of multiple-choice questions, quizzes etc., the benefits were described in terms of improvements to the quality of the assessment approach. Because the systems were automated and linked with learner management systems, the instructors/assessors perceived benefits to include having a documented, consistent assessment process where the technology allowed ease of monitoring learner progress and the provision of immediate feedback—all features improving the quality of assessment processes.

The initial investment of time and money in the design of computerised and automated online assessment activities was seen as a cost-effective approach in contexts where large numbers of learners are involved.

For a 'not-for-profit' Australian distance education VET provider delivering automatically marked online assessments, the benefits were identified as savings made in the marking costs and having a tracking system which allowed the organisation to monitor learner progress. Specific responses included:

- time saving for the teacher
- having an online database of assessment—as part of a test bank, allowing randomised items that have been validated against the learning outcomes
- having a variety of validated assessment items (in preference to the reusing of assessments year after year)
- capacity to mark short-answer questions.

Table 10: Benefits of online assessment for teachers/assessors

Benefits	No. of times mentioned
Improved assessment process	16
Allows for flexibility	15
Saves time in the long term, quick feedback to learners	11
Creates consistent, standardised assessment	10
Make up classes/more learners	9
Progress can be monitored	9
Documents assessments	8
Personally interesting, satisfying, creative	6
Financially attractive	4
Allows for integrated teaching/learning	3
Better interactions with learners	3
Alternative delivery mode	3
Learners can be assessed equally	1
Improved pass rates	1

One informant touched on the issue of the imagined ease with which the online environment might support assessment. He suggested that in the early stages people are attracted to 'assessment nirvana' imagining it to be an easy solution. However, as some of the international (see the Computer Assisted Assessment Centre work and the TRIADS projects)[1] and local projects suggest, computer-assisted assessment online of a high standard requires significant developmental work. There is a high cost associated with the design of assessment items and the development of banks of items which support valid and reliable assessment activity.

The availability of such item banks however, is seen as a real benefit for instructors/assessors. As a local informant suggested: 'If the design of the assessment is good, then it can be a whole lot better than a face-to-face assessment'.

Other comments made by respondents included the capacity for the quality of the assessment to be improved through:

> ... rich testing medium over and above paper delivery: video, sound, animation.
>
> ... the standardisation of content ... gives an increased quality product.
>
> ... the use of online assessment has improved the quality of our training.

The ability to assess large numbers of learners and to provide learners with access to results quickly was seen as beneficial to a significant number of respondents. It is worth noting that a number of respondents referred to the online assessment environment as personally interesting and satisfying. However, when questioning respondents, many qualified their statements about benefits immediately by explaining the labour-intensive nature of the process and the necessity for staff training.

Table 11: Factors influencing choice of online assessment method

Factors	No. of times mentioned
Flexibility	18
Instant feedback to learners	16
To meet the needs of distance learners	10
Cost	9
Enables group work	7
Potential to be interactive	6
Learners can access assessments remotely	5
Online assessment considered better	3
No choice—corporate decision	3
Capacity for standardisation of assessments	2
Online can assess higher-order learning	2
Ease of use	2
For use in recognition	1
Enables variety of question types	1
Model for teacher trainees	1

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[1] The Computer Assisted Assessment Centre was established in the United Kingdom as a 3-year project (1998–2001) to assist staff in higher education with the development and implementation of computer-assisted assessment (<http://caacentre.lboro.ac/uk>).

Research projects highlighted by the centre include University of Derby's TRIADS (Tripartite Interactive Assessment Delivery System). TRIADS is a toolkit for users of Authorware Professional designed to facilitate rapid and easy production of computer aided assessments.

In summary

The literature highlights a wide range of factors and considerations for choosing and designing online learning and assessment. Learner characteristics, learning style preferences, learner readiness, learner and teacher skill levels, suitability of the discipline, high-risk contexts, institutional contexts, assessment purposes and technical considerations are just a few of these.

One of the most important considerations emerging from the data is that the decisions have to be made with reference to a combination of factors. No single factor emerges as an 'only' consideration. Technology tools are not the starting point. The starting point for any learning design is the specification of what is going to be learned, how the learning is going to be facilitated and what is going to be assessed. Having this as the starting point encourages pedagogically sound decision-making about the use of methods and tools.

9 Issues in online assessment

Issues raised in the literature

A number of unresolved issues have been raised in the literature on online assessment to date. Suggestions for solutions for some of these are proposed by the authors and these are included in chapter 10.

Technical issues affect all forms and types of online learning and thus online assessment. These include:

- bandwidth
- computer hardware compatibility between education/training provider and learners
- computer software compatibility between education/training provider and learners
- compatibility problems with operating systems and versions of operating systems
- equipment reliability and the need to have technical support to keep systems operating effectively.

A related issue is the lack of access to equipment and infrastructure, due mainly to geography and lack of resources at all levels—national, state, local and personal.

O'Reilly and Patterson (1998) confirm that:

> Access to browsers, hardware and software, technical support and cost-effective ISPs [internet service providers] are issues for consideration in providing options for assessment.
>
> (O'Reilly & Patterson 1998)

Solutions to the technical issues raised are beyond the scope of this research, but a number of other issues were identified:

- the need for institutional policy and attention to administration
- managing security/integrity of online assessment
- costs associated with development of online assessment systems
- time-management issues in providing timely and meaningful feedback to learners
- obtaining the right mix of technical skills and assessment design skills to create online assessment systems that make best use of technology and pedagogy
- the need to develop and offer prelearning online assessment activities that will assist retention/completion rates
- the need for effective methods to measure quality of online contributions by learners, when used as part of summative assessment.

Institutional policies and administration

Morgan and O'Reilly (1999) discuss the need to develop and/or tailor assessment policies for open and distance learning contexts. They suggest that open/distance assessment policy 'should be developed with more than a token understanding of the range of issues and concerns of part-time, adult learners' (p.93). They suggest policy development and modification in a number of areas:

- facilitation of a whole-of-course approach to assessment
- ensuring that appeal procedures are appropriate to the open/distance learning process and the needs of learners undertaking learning in that mode
- extension of time for completion of assignments, reflecting both the understanding that adult learners have many demands on their time, as well as the need for learners to develop time-management skills and self-discipline as part of the learning process
- ensuring that marking practices will reflect the quality principles of validity, reliability, flexibility and fairness
- addressing the issue of plagiarism.

Webb and Gibson (2000) identified a number of issues relating to assessment in the implementation of an online course in information technology. They noted the tensions between established administrative processes in the institution and the flexible assessment and delivery arrangements really needed for the course.

Spear (2002) and Dobbs (2002)[2] raised the issue of recording of evidence that has been used to assess competence online. This evidence can take a variety of forms, including electronic and other types. Institutions need to consider policy development to cover the storage and maintenance of these records in case of later disputes over judgements. The development of online assessment management systems to monitor progress and achievement also needs to be considered.

Another area of policy compliance raised by Choy, McNickle and Clayton (2002) was the need for adherence to state and national privacy legislation in relation to the release of online assessment information.

Harper et al. (2000) noted that few institutions have published policies on their approach to online delivery, probably due to the fact that most organisations are still in the early stages of online learning development.

Maintaining security/integrity of online assessment

Considerable work is taking place in the development of increasingly sophisticated security systems and improved test design that can incorporate the assessment of higher-order skills. These methods are outlined in chapter 10.

James and McInnes (2001) have studied plagiarism in the online environment and conclude that the increased incidence of this problem has wider social implications than simply devising strategies to detect it. They believe that learners need to understand the values implicit in education for a longer-term solution to the problem.

In an online training manual that has wide application for the training of VET practitioners in the use of online assessment materials, Labour et al. (2000) give practical tips on how to secure an online assessment. They conclude that:

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[2] Contributions from participants, Spear and Dobbs, during a tele conference consultation for the Australian Flexible Learning Framework's project, 'Quality auditing of online learning'.

> In any learning situation, honesty and integrity are paramount particularly in regards to summative assessments. The issue of impersonation (and/or possibility of impersonation) at assessments has remained a major cause for concern and an ethical dilemma for online learning. (Labour et al. 2000)

The British Standards Institute has recently announced the introduction of a new quality standard (BS 7988) addressing the issue of cheating in online examinations. According to the British Standards Institute website:

> To comply with the new standard, organisations running exams will need to develop methods to verify online candidates who may be at remote locations. Opportunities need to be made for practice tests for candidates to gain familiarity, and steps taken to ensure that exams don't disadvantage people with special needs or those without IT [information technology] skills. Examiners must take mandatory breaks from the screen, and take measures to prevent screen-snooping, cribbing via emails, and accessing websites. (British Standards Institute)

White and Davis (2000) provide a discussion on the issues associated with the creation of large-scale test banks. They highlight the need for more research into the ability of large-scale tests to assess higher-level cognitive skills. They also raise the issue of compatibility between operating systems. With the capacity to be used in a number of locations, large-scale test banks would be most cost-effective, but lack of compatibility between computer systems can pose a problem (White & Davis 2000).

Costs associated with development of online assessment systems

Harper et al. (2000) point out 'the real costs of developing online systems are rarely fully examined before projects are begun, and more comprehensive costing and cost-effectiveness studies are required to inform administrators and funding bodies in decision-making' (Harper et al. 2000). They also found that a centralised system for the development of online learning seemed to result in a more coherent approach to addressing resource implications in the areas of infrastructure, personnel, professional development and administration, than did an ad hoc approach.

Pollock, Whittington and Doughty (2000) provided parameters for use in analysing the costs and benefits of establishing a computer-assisted assessment process. Cost gains can include a reduction in hours spent by staff in setting and marking exams. Other savings can arise both for individuals in terms of time, and for organisations in terms of retention rates, when individuals are offered online recognition processes that can shorten the length of courses.

Pollock, Whittington and Doughty also see a benefit in the potential of computer-assisted assessment to allow greater flexibility and fairness for learners from diverse backgrounds who need varying timeframes to complete courses. The self-paced aspect of computer-assisted assessment can allow courses to be more effectively tailored to the needs of individuals.

Bates quoted in O'Reilly and Patterson (1998) uses the ACTIONS model to analyse cost-effectiveness issues in using technology in education:

- **Access**: how accessible is a particular technology for learners?
- **Costs**: what is the cost structure of each technology?
- **Teaching functions**: what are the best teaching applications for this technology?
- **Interactivity and user-friendliness**: how easy is it to use?
- **Organisational issues**: what changes in organisation need to be made?
- **Novelty**: how new is this technology?
- **Speed**: how quickly can courses be mounted/conducted with this technology?

(Bates in O'Reilly & Patterson 1998)

Time-management issues

While the online environment has the potential to provide rapid feedback to learners, the demand on the assessor's time to provide this is frequently raised as a major issue (Choy, McNickle & Clayton 2002, Brennan forthcoming). The literature includes a range of innovative ways to manage this problem and solutions are further developed in chapter 10.

The right mix of technical and assessment design skills to create online assessment systems

There is a clear need for professional development to ensure that online course designers have the right mix of technical and pedagogical skills. This has been well identified in the VET sector (Choy, McNickle & Clayton 2002; Brennan forthcoming; Cashion & Palmieri 2002; Kemshal-Bell 2001).

The need for professional development has also been recognised in the higher education sector. O'Reilly and Patterson (*1998*) noted that:

> Academic staff development therefore involves not only the upskilling of teaching staff in the use of hardware and software which is required to carry out their tasks, but also in the principles which guide the process of learning through a new medium.
>
> (O'Reilly & Patterson 1998)

Harper et al. (2000) also commented on the usefulness of a team-based approach to the instructional design process of online delivery. They noted that:

> Respondents highlighted the importance of establishing cross-functional teams involving a range of people, including teachers, designers, technical advisers, managers and administration and support staff. (Harper et al. 2000)

The availability online of a list of potential mentors for new entrants into the field of online instructional design and delivery would be very useful.

Considerable work could be done to develop online tutorials and practical tools for course designers in the areas of best practice in online assessment and for determining the validity and reliability of online assessments for competency-based curriculum.

Pre-learning online assessment activities

Several authors have identified the need for extensive online/computer-based formative assessment to assist learners to identify gaps in their learning (Bostock 2000; Peat 2000; Baggot & Rayne 2001). A few examples of pre-learning self-assessment were found in the literature (Educational Training Service website; Taylor 1998; Drew, Thorpe & Bannister 2002). Additional effort in this area could help to address motivation and retention issues related to inappropriate preparation/placement. There is also a need for online course designers to develop pre-learning online assessment activities that can identify the learning support needs of potential learners.

Choy, McNickle and Clayton (2002) provide confirmation of this in their examination of online learning from the perspective of the learners, and have identified a range of issues that concern the learner in the online environment. The issues include the need for:

> … pre-enrolment assessment of key competencies and other knowledge, skills and attitudes related to both online learning/computer use and the subject matter of the course/module …
>
> (Choy, McNickle & Clayton 2002, p.51)

Effective methods to measure quality of online contributions by learners

A number of authors raise the issue of developing effective methods for evaluating the quality of online assessable interactions, not just the quantity of these interactions (Maor 1998; Brennan, McFadden & Law 2001; Downes 2002; Edelstein & Edwards 2002).

McLoughlin and Luca (2001) raise the issue that any 'benchmarks must be transparent to learners, and must represent authentic behaviour and expectations'.

A range of methods in use to measure online contributions is described further in chapter 10.

Challenges and issues raised by respondents

A somewhat different set of issues arose from the interviews conducted with online assessment practitioners. Many of the issues raised here related directly to the implementation/delivery of online learning and assessment. As one would expect from talking with busy practitioners, many of the issues reflected daily concerns relating to equipment, funding and lack of time.

However, there were also concerns raised relating to the human side of the online learning equation, issues such as professional development, the need to bring about culture changes and paradigm shifts, and a concern with access and equity in regard to the technology. The practical and resource-based issues included:

- breakdown/lack of, or proper functioning of systems/hardware
- incompatibilities between systems/software/hardware
- bandwidth
- how to make best use of limited funds available for development/maintenance/delivery/evaluation of online learning and assessment systems
- lack of time to provide feedback to learners
- large amounts of time needed to set up, monitor, maintain and evaluate online learning and assessment systems
- lack of time to keep up to date with changing technology/current developments in the field
- lack of time to publish outcomes of activities (VET sector).

Other issues relating to human factors, such as the knowledge and skills of teachers, designers and learners included:

- lack of access to online technology for some sections of the community, including people in remote areas
- concern about learners' computer literacy and ability to cope with online learning
- need to get staff and learners to accept culture change in terms of moving into online learning environment and incorporating learner-centred learning approaches into online assessment design
- need for professional development in all aspects of online assessment
- need to update educational/pedagogical knowledge and skills to ensure authentic, valid assessment of higher-order thinking skills.

Improving the technology skills of both learners and 'assessors' in order to make more effective use of online learning and assessment activities was identified as a significant issue by a number of informants, and one which would affect the rate of implementation.

> If we use the medium effectively we'll be able to have more in depth and adequate assessment. It will take us a while for teachers to identify the power of the medium and use it effectively ...

> ... was generally seen as the need for resources, particularly the time involved in producing assessment but also the technical resource of access to bandwidth. The need for staff to be trained in appropriate use of the technology was very commonly raised and specifically the need for 'culture change'.

A British adviser on academic quality enhancement agreed with Ryan's concerns about trivialisation of content knowledge within online assessment unless staff development and quality assurance support is put in place.

> Lecturers' main aim is reducing the marking burden with ever-increasing numbers of students. I think they see CAA [computer-assisted assessment] as having the potential to save them a great deal of time. (They don't understand how long it takes to build a bank of quality questions that test what they are going to test.)
>
> I think that more sophisticated uses of CAA are possible, particularly if combined with graphics, diagrams, sound, images, video etc. and used innovatively. However this takes time and money and usually specialist support in designing the multimedia elements and the questions ...

One of the major challenges and issues related to skills of staff, in relation to both information communication technologies and assessment design itself. As one VET respondent commented:

> Despite the enthusiasm of early adopters there is still a large number of people in the VET sector who do not use computers in their work or even in their home.

Another challenge, particularly for an organisation where employment and status is based on a 'para-military' model, is the introduction of new ways of learning and assessing. In other words a cultural shift is required.

> We are in the early days of online assessment—we need a culture change for full-blown implementation.

One of the challenges for those involved in the medical program is the size of the maintenance task associated with the content database used in the program, problems, questions and scenarios used in the learning and assessment activities.

> Our problem is that we have 70 problems, up to 7 groups with 5 or 6 questions for each so it is a huge maintenance task to manage the content ... It is very labour-intensive. We need to update them as the curriculum gets modified over time, and keep up keep up with new research.

Respondents in this survey did not volunteer issues relating to learners or the readiness of learners to learn in the online environment. This may be explained by the emphasis on the designer and the design in this survey rather than on the learners, but nevertheless it is interesting how few respondents referred to learners.

As plagiarism has been raised extensively in the literature we specifically asked respondents to give feedback on strategies to overcome it. These are outlined in chapter 10.

Table 12: Perceived challenges to further implementation of online assessment

Perceived challenges	No. of times mentioned
Time to produce assessments	16
Need for staff training	14
Finances	6
Sufficient bandwidth	4
Culture change needed	4
Access to computers	4
Technical challenges	4
Validity	3
Learners' skills	2
Authenticity	2
Industrial implications	2
Learners' needs for social interaction	2
Test design	2
Relevance to workplace	1
Face-to-face can assess more skills	1
Lack of standards	1

Summary of findings

The factors influencing the choice of an online assessment method focussed on issues such as flexibility for facilitator and learner, the capacity to provide feedback to learners, the development of communication, research, collaboration and team skills, and the ability to simulate real experiences for learners. The potential for interactivity between learners and learners, learners and facilitators, plus the opportunity created for peer review and assessment were raised by some respondents as further important factors.

Respondents are currently using the online experience within their classes for:

- gathering and collecting material (facilitators receiving emailed reports or learners collating portfolios)
- giving and receiving timely feedback (learners completing online tests, quizzes, multiple-choice questions to gain feedback on their progress)
- developing communication skills (learners participating in threaded discussions, chat facilities, contributing to bulleting boards)
- establishing collaboration between teams (learners and experts contributing to group work)
- encouraging self and peer review (posting websites for review, critiquing report postings).

Self and peer assessment is taking place in many of the examples given. Although these examples may be regarded as formative assessment, for the most part, respondents did not view the activities as part of the overall assessment strategy. However, there were some instances of peer and self-review contributing to the overall summative assessment.

Generally, the respondents considered that the principles of quality online assessment are the same or similar as those principles used for assessment in any context. Support was given to the belief that assessment must be valid, reliable, flexible and fair. If anything, the focus on the development of online assessment strategies has highlighted the need to examine the overall purpose of the learning so that assessment strategies can be designed to align closely with aims of the course or module, and cater to all learning styles.

Respondents considered the main challenges to implementing online assessment to be the time and cost of effective online assessment strategies, technological issues (such as bandwidth and capabilities and compatibility of the facilitator's and learner's computer hardware), operating systems and software, plus the readiness and ability for learners to adapt and cope with the online medium. However, the need for staff training was also raised at length. The potential for cheating remains a concern for some which may explain the limited use of online assessment for summative assessment.

The support for the use of online assessment cites the major benefits to learners as flexibility of the time and location where assessment can be undertaken, and the potential of online assessment to give immediate feedback to the learner.

The major benefits to designers were seen as the potential to improve the quality, consistency and documentation of the assessment process. Flexibility of time and place to conduct the assessment was also considered important.

Identifying issues and expanding the use of the online environment for assessment

The literature review was able to answer the first two questions (see p.7) posed by this research. The principles of quality assessment in the online learning environment are seen by writers generally as being the same as for any other learning environment and incorporate the four critical principles of validity, reliability, flexibility and fairness. The difference for assessment in the online environment is that it should make use of the unique communication functions made possible by the internet and related technology.

The literature review provided ample evidence that common assessment purposes can be supported through the use of online technologies. Examples of formative and summative assessment abound in the literature. There is a more limited body of literature on pre-learning recognition and diagnostic assessment, and it is clear that this is an area for potential growth, particularly in the VET sector.

The third question (see p.7) was answered both through the literature search and through the interview process. Here again, all assessment methods and tools can work effectively in the online environment, and there are many instructive and varied examples of assessment methods being used for online learning. The important point here is that the assessment method(s) and tool(s) should be determined through careful consideration of the assessment purpose, the audience/learner characteristics and the level and type of learning content, process and outcomes.

In the literature review two factors affecting the choice and design of assessment methods were examined: the characteristics of the learner and the discipline or content area being assessed. The main point emerging from this examination is the need to be aware of which assessment methods seem to work best for learners with different characteristics and in different discipline areas.

Existing research indicates that certain learners find the online learning process less daunting than do other learners. For example, people with experience of computers in the workplace or through prior education seem to experience less frustration and greater success than learners with limited experience of computers, either in the workplace or in educational settings.

Online learning and assessment, like other forms of flexible and distance learning, can require high levels of self-discipline, motivation and time-management skills. Therefore online learning and assessment designers and deliverers should attempt to make online assessment experiences as motivating, transparent and user-friendly as possible for all users, but particularly for those who are less likely to have had a successful experience with online learning.

In terms of the relationship between discipline area and online assessment, the literature indicates that some discipline areas lend themselves easily to objective assessment, while other disciplines lend themselves more readily to subjective assessment methods. Both objective and subjective types of assessment can be conducted effectively in the online environment, but may lead to different decisions about issues such as security, authentication of learner performance, learner involvement in the assessment process, and use of tools such as automated marking systems/software that can reduce teacher time commitments.

Both the literature review and the interview process identified a number of issues in online assessment, which could be construed as pitfalls, challenges and barriers to successful implementation of an online assessment process. The literature search pointed to a range of educational issues that could affect the decision-making about the online assessment method or process. The interview process tended to raise operational and administrative issues relating to online learning and assessment, but many of these were linked to educational issues.

Interestingly, while designers and deliverers interviewed were very positive about the potential of online assessment, they are currently making only limited use of authentic, problem-based formative, summative and continuous assessment in the online environment. The literature review clearly indicated that there is considerable scope in the online learning environment for such learner-centred assessment to occur. The task at hand is to encourage online assessment designers and practitioners to expand the range of formative, summative and continuous online assessment.

This may be achieved through greater attention to pedagogical factors in the online assessment planning and development phase.

Themes and issues were identified from the literature and interview responses which are either current barriers to expanding online assessment, or when solved, could enhance the potential of online assessment. Issues selected for further examination were those that related specifically to the development, implementation and enhancement of current approaches to online assessment. Issues that did not focus directly on design or implementation of assessment but related to broader organisational issues, access to funding and other resources, were not selected for further examination as they were outside the scope of this project.

A number of concerns related to the capacity of the online environment to support and enhance a learner-centred approach. Interview respondents raised the contradiction that the online environment is seen by some as having the potential to improve learner-centeredness and by others as restricting it. This depends on how the learning process is designed. In order to enhance the online learning environment, it is important to focus on the factors that would enhance learner-centeredness. These include how interactivity between assessors and learners and between learners can be better developed, how assessors can understand more about their learners and how assessment can be meaningful to the learner.

The issues selected for further development from this process:

- using the online environment to expand the learning and assessment possibilities through:
    - self-assessment
    - peer assessment
    - group/collaborative assessment
- measuring the quality of online interactions/contributions between learners and between learners and teachers
- creating valid, authentic online assessment
- assessing learner readiness for online learning and assessment
- time and resource management for online assessors
- providing online support for online assessors
- cheating—ensuring authentic learner performance.

Online design and delivery experts' views were sought on how these issues could be addressed and the literature was scanned for additional ideas and solutions. The issues are addressed in chapter 10.

10 Finding solutions

Using the online environment to expand the learning and assessment possibilities

Boud (2002) discusses the importance of and imperative to engage learners in the assessment process. He notes that the assessment paradigm in operation in many past and also current teaching and learning situations involves the view of assessment as 'an act performed on the learner'. This paradigm overburdens the teacher and disenfranchises the learner.

Boud is suggesting that the lack of transferability of skills and knowledge to new situations so often observed by teachers, trainers and employers, may be due, at least in part, to the lack of learner involvement in the assessment process. Allowing learners to be involved in the assessment process is perhaps the most critical factor in creating authentic assessment activities that will reflect tasks undertaken in the real world.

In a student-centred learning culture, learners should have input into the determination of assessment criteria, the design of assessment events and should contribute to the judgement of what is an appropriate outcome. The development of self-assessment strategies can support this.

Student-centred learning should reflect real-life contexts. In workplaces, employees, especially managers, are often asked to make judgments about people, processes, and planning without necessarily learning how to do so. In fact, many people in the workplace have not had an opportunity to develop the necessary skills to give constructive feedback to colleagues using appropriate communication strategies.

Through active involvement in assessment, learners can develop these evaluation skills. Group and collaborative assessment events prepare learners for the workplace where people are expected to work together in teams to achieve a range of outcomes and/or to solve complex problems.

Bostock (2000) quotes advice by Race (1995) that could encourage the development of more learner-centred learning as well as saving valuable time for teachers:

- Try to develop skills to help students share assessment tasks and criteria, rather than approaching assessment as a timed, competitive activity.
- Put students in control of their learning by getting them to set questions and to answer them.
- Use self and peer assessment.
- Train students in the use of the assessments they will be given. (Bostock 2000)

In this section, we examine three methods for involving the learner in the assessment process which could be used far more extensively in the online learning environment: self-assessment, peer assessment and group assessment.

Self-assessment

The issue raised here revolves around the provision of meaningful opportunities in the online environment for learners to reflect on their learning via the assessment process. As noted earlier, in a student-centred learning culture, learners should be integrally involved in the assessment process.

Self-assessment is also a critical lifelong learning skill. Learners need to be able to assess themselves and identify strengths, weaknesses and gaps in their learning, in order to benefit from the formative assessment process.

Some learners may not wish to share their evaluation of their own learning with the teacher/facilitator. This highlights the need to provide several different ways to allow learners to self-assess, for example, by using reflective online journals, quizzes, trigger questions or questionnaires to encourage self-assessment in the online environment.

Self-assessment has been used in the online environment for a number of purposes, including diagnostic (entry readiness), formative and summative assessment. Taylor (1998) reports on the 'development of a computerised self-assessment system (Self Test) that was designed … with the particular goal of providing learners with a means to diagnose their preparedness for a subject or to ascertain their mastery of particular topics'.

Self Test was designed to improve upon other available computer-based diagnostic or self-assessment packages in the area of mathematics. Self Test was also designed so that only basic computer skills were required. It also has the capacity to be customised to any subject area using simple word processing, graph and picture drawing software.

Peat (2000) discusses the use of self-assessment modules (SAMs) to address difficulties first year biology students were having in mastering key associations and concepts. These modules provide activities on four levels of increasing difficulty using Bloom's taxonomy of thinking skills.

As a facilitator, respondent 41 (university deliverer) comments that his learners' self-assessments allow him to direct the learner to further information, areas for development and enhancements to their learning experience.

Within respondent 12's (Enterprise manager) workplace the computer system used for online training, and assessment is the same as that used for work. Therefore the learners are comfortable and familiar with the system. Learners are able to access the system and complete a self-assessment checklist at any time. The checklist is used as a tool to determine the applicant's readiness to proceed with the recognition process for identified competencies.

McAlpine and Higgison (2000) provide a useful discussion of self-assessment in the online environment. They note that self-assessment can help move learners 'towards becoming more reflective, autonomous and effective learners'. They go on to say that 'Self-assessment emerged as a popular strategy in online learning …' and 'Self-assessment is frequently used for formative assessment of learners …' often via short tests using multiple-choice, fill-in-the-blanks and 'hotspot' questions. Respondent 22 (university deliverer) gives his learners a summative test every three weeks throughout his course. To help the learners prepare and to assist them in determining their level of understanding, he sets a series of online self-assessed tests beforehand.

Respondent 10 (university designer/deliverer) states that there is no self-assessment as such used in his course. However, learners submit their prescribed exercises to a web server for automated marking and instant response. This gives learners immediate feedback so that they can assess their own progress and understanding. Respondent 42 (university deliverer) explains that self-assessment is an important part of the course. To prepare for self-assessment, respondent 42 sets her learners a variety of fun, anonymous and automatically marked tests. She states that her learners are free to ask for explanation or further discussion about a topic. With all self-assessment tasks respondent 42

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provides detailed explanations and direction to further reading and study—whether the learner's answers are right or wrong.

Respondent 6 (TAFE designer/deliverer) explains that one of the best features of a particular learning tool being used at his college was the ability for learners to return to their original postings to edit and supplement their own contributions.

A number of the case studies cited by McAlpine and Higgison used reflective journals in the self-assessment process (Nurmala 2000; Cowan 2000; Gwynne & Chester 2000).

Respondent 8 (manager, private company) mentions the use of online portfolios as a means of gathering evidence in compliance training. Evidence diaries and online portfolios help learners to self-assess their skills then compile evidence and add information as they learn. Respondent 7 (TAFE instructional designer) uses learning journals that help learners reflect on what they have learnt and allow them to build from that base.

Respondent 3 (TAFE manager) manages an online course about online learning. Through a mix of online communication, collaboration, exploration and team work, learners can learn about online learning in an experiential way while adding to the body of knowledge previously gathered. A measure of the learning within this course is the self-assessment of the learning experience itself. Learners can experience tools and techniques first hand, and compare their views on various assessment methods. While doing so, learners develop an appreciation of the need to design learning that suits a range of learners.

Peer assessment

There are two reasons given for using peer assessment. The first is to develop skills for the workplace in terms of being able to provide constructive feedback and appraisal of performance. The second is to reduce marking time for the instructor by using peer assessment in situations where it is appropriate.

Using peer assessment in a formative assessment process is readily accepted. However, many educators may be concerned about allowing learners to make binding judgments about summative assessment events. Learners may feel uncomfortable with the process of making judgments about the performance of fellow learners.

Leask (1999) makes the observation that peer and self-assessment can help learners develop skills in the key competencies of team work, problem-solving, leadership and creative thinking. This view is supported by respondent 9 (university designer/deliverer) who states that these are significant skills essential to the workplace.

Davies (2001) discusses the Computerised Assessment by Peers (CAP) system that he developed in 2000. This section 'provides an online means of learners assessing the essays of their peers, and providing formative feedback'. Davies quotes Robinson (1999) as saying that the peer assessment process '… pushes the learners to think about the qualities that contribute to good work' (Robinson 1999 cited in Davies 2001).

McAlpine and Higgison discuss the role of peer assessment in the case studies cited in their chapter in the publication, *The OTIS online tutoring e-book*. They note that the 'case studies document many examples of assessment by self, peers and tutor'. However, they found that, in most case studies, the peer assessment was used for formative assessment only.

For the interview respondents, the notion of sharing and learning from one another through peer assessment of collaborative project work (respondent 16, university deliverer), by allowing learners to access one another's portfolios (respondent 19, university deliverer), and accessing online discussions and collaboration to develop individual assignments (respondent 16, university deliverer) was made possible by the use of the online medium.

Where assessment is an integral part of the learning process, some interviewees did not see peer reviews as forms of peer assessment. Respondent 3 (university deliverer) has each of her learners prepare a short critique of a topic which is then posted for review and comment by all learners. The discussions are rich and hugely beneficial to the learners. However, there is no formal assessment of the discussions and therefore the reviews are not considered as assessments. Respondent 16 (university deliverer) allows her learners to post draft assignments for review. The drafts are accessible by other class members who are also able to comment and reply to the author.

Respondent 41 (university deliverer) reported that peer feedback contributed to the overall summative assessment of his learners. However, peer assessment, as reported by the respondents interviewed, was used much more as a discussion starting point or to develop initial thoughts and ideas introduced by a piece of work.

Davies (2001) notes that: 'The problem with any peer assessment operation is how to get the learners to perform the marking process in a professional and objective manner' (p.4). The method used within the Computerised Assessment by Peers system is to award marks for the marking process itself. The marks are allocated according to how well the learners have been able to justify the marks they have given. This allows considerable time savings for the instructor as he/she only has to mark 'the "marking process" rather than the essays themselves'. Respondent 45 (university deliverer) has found that you cannot assume that all learners will assess effectively. He states that some learners miss out on insightful feedback if the assessing learner has not been sufficiently rigorous.

Bostock also discusses the use of peer review and notes that 'other learners may not be as capable as tutors, but they are much more capable than most software' in assessing their peers (Bostock 2000, p.2). Bostock quotes Robinson (1999) as saying that concerns over the use of peers in summative assessment 'could be answered by anonymity and multiple reviewers'. Bostock also points out that, although unaware of any software developed specifically to support assessment by anonymous peer reviewers, he believes that 'a mix of manual administration, email and standard web forms could achieve most of what is needed' (Bostock 2000).

Some types of subject matter might be more readily assessed by the learners. Bostock describes a peer assessment process in a multimedia and internet module in a masters degree course in information technology:

> Email and web forms were used for peer review of coursework. Students put a prototype application on their websites and filled in a form to give its URL. By email they were told which four applications of other students they were to review formatively, and their secret reviewer's number. On a web form they gave marks and comments on several criteria, which were sent anonymously to the authors and to the tutors … At the submission deadline, websites were frozen and then summative peer reviews of the same applications were done, sending marks only to the tutors. The four marks per author were compiled and moderated by the tutors. (Bostock 2000, p.3)

Respondent 45 (university deliverer) ensures all learners post their web prototypes for peer review. He maintains that the process must be anonymous to allow learners to conduct honest and rigorous assessment of peers.

Group/collaborative assessment

Group or collaborative assessment events are being used for two purposes. The first purpose is to develop useful skills for the workplace in terms of being able to work within a group and to provide constructive feedback or appraisal of performance within the context of a team. This performance appraisal can be related to the overall outcome of the assessment activity, as well as to the contributions made by individuals within the group.

The second purpose would be to reduce marking time for the instructor by using group or collaborative assessment in situations where it is appropriate.

It is well documented that collaborative learning is a positive learning tool (Olguín, Delgado & Ricarte 2000; Ragoonaden & Bordeleau 2000). Industry and business today recognise that the ability to work collaboratively towards a single goal is a critically important skill (Wilson 1997; Andres 2000). In industry or business, more emphasis is placed on the formation of teams. Team members whose agendas do not fit the team outcomes have to either alter their agendas or leave the team (Gundry 2000). However, the traditional face-to-face environment is generally centred around individual learning. Collaborative learning and assessment can be developed effectively in the online environment.

Some educators may be concerned about allowing learners to make binding judgments about summative assessment events. Learners may feel uncomfortable with the process of making judgments about the performance of fellow learners, particularly those with whom they have been in a close working relationship in, for example, a group situation. At the same time, many learners do not like group work because of the lack of assessment criteria and processes for providing feedback to group members who are not doing their fair share of the work. Despite these hurdles, there are already a range of interesting examples of group assessment and these need to be further developed.

McLoughlin and Luca (2001) used a case study to show a range of assessments for online learning that focussed on the learning process as opposed to content-based outcomes. The case study involves an interactive multimedia course at Edith Cowan University. In the course, teams of four or five learners use their specialist skill to build an electronic portfolio.

McAlpine and Higgison (2000) define group/collaborative assessment as '… small, interdependent groups of learners work[ing] together as a team to help each other learn—the group members are dependent on each other'.

They provide insights into how a number of online learning practitioners are incorporating group and collaborative assessment practices into their online courses. They note that 'most of the case studies describe multifaceted approaches to assessment' and quote Phillips (2000 cited in McAlpine & Higgison 2000) to typify online assessment in the case studies as involving 'a rich mix of group and individual assessment methods'.

Klemm and Snell (1996 cited in Morgan & O'Reilly 1999) argue for the use of computer conferencing to 'raise the intellectual level of group discourse by requiring learner groups to produce tangible products not just opinion comments'. Morgan and O'Reilly credit Day (1998) with the idea that ideally, computer conferencing should be well integrated into the subject and will be more purposeful if it is assessed (Morgan & O'Reilly 1999).

Respondent 9 (university designer/deliverer) is using the collaborative medium not just as a means to develop the content-based skills from the course but to expand and to develop the learners' key competencies.

Respondent 6 (TAFE designer) likens the online collaborative discussion about a topic to the buzz in a classroom when learners are sharing insights into a new piece of work. Respondent 16 (university deliverer) uses the online discussions and collaboration as a resource for the learners to access when they are researching and writing their essays.

Respondent 5 (TAFE manager) and respondent 8 (manager private company) mention the limitations of collaborative assessment in terms of access to computers, the age of available technology and the lack of bandwidth that might make collaborative online learning difficult. Respondent 19 (university deliverer) and respondent 15 (university deliverer) use a portfolio approach to assessment. Respondent 15 has sole access to all the portfolios of his learners in his class; however, respondent 19 allows all the class (trainee teachers) access to everyone's portfolios. His view is that each learner can benefit from looking at the simultaneous development of portfolios, learn from each other, and improve their own performance and evaluation skills as a result.

Summary

The involvement of learners in the online assessment process covers a spectrum of activities and is used for a range of assessment and learning processes. For the most part, self-assessment is used as a self-check to guide the learner towards areas of study that need further work. Some self-assessment is used as an assessment process in itself, with the learner's own self-evaluation being used as a measure of the learning process.

Peer assessment or review has been introduced in many learning situations as a means of making the learning process richer, enabling learners to share their collective opinions and findings, and as a step towards a better understanding of the issues raised. There are currently examples of the peer assessment process being a contributory factor in the summative assessment processes for specific courses.

The collaborative learning environment is recognised not just as a tool to help learners develop knowledge and understanding of a subject, but also as a means to help learners prepare and hone specific workplace skills. Collaboration is considered an important key competency for workplace readiness. Tasks incorporating collaborative learning and assessment allow topics to be discussed and explored more thoroughly.

Feedback from respondents did not refer to any beneficial time-saving elements by incorporating self, peer and collaborative assessment into the overall assessment strategy, although the literature did provide evidence of this.

Measuring the quality of online interactions/contributions between learners and between learners and teachers

Several authors raised the issue of how to measure effectively and appropriately the *quality* of online interactions as opposed to the *quantity* of online interactions. Facilitators want to include learner interaction in the course, and furthermore, they want to assess learners' participation in online discussions and learner interaction with the online community. McKavanagh et al. (2002) noted the need for the development of evaluation tools that can 'take account of how to document and analyse learner interactions' that take place within 'web based flexible learning systems'.

The opportunity for meaningful interaction, often involving learners who would not feel confident or comfortable in a face-to-face situation, is one of the features and benefits of online learning and assessment. However, if instructors want to incorporate online interaction into the assessment process, some form of assessment criteria needs to be established.

A simple count of the number of interactions could be one of the criteria, but determining criteria that could assess the level of understanding and depth of thinking underlying the interaction would be more valuable to the learners. Problems for learners include lack of understanding of how to access opportunities for interaction, feeling uncomfortable about posting public messages, and believing that the process takes up too much time.

Problems from the instructor's point of view may relate to not knowing how to structure the interactions, and not being able to identify appropriate assessment criteria that measure quality, as opposed to quantity. Professional development for instructors in effective facilitation of online interactions may provide guidance.

There are three stages embedded in this issue:

- enabling and encouraging interaction in the first instance
- determining how the interactions will contribute to overall course outcomes (either summative assessment, formative assessment or not at all)
- identifying appropriate assessment criteria if the interactions are to be assessed.

Perhaps the initial consideration before deciding to measure the quality or quantity of online interaction is to determine the technical or logistic issues learners might have accessing the web. Holland (2000) notes that learners felt anxious when technology was perceived to create a barrier to learning. Maor (1998), an early adopter of online learning, raised the issue of how to evaluate learners' participation and interaction in the online environment. The major problem Maor encountered was how 'to get everyone started and communicating on a regular basis'. This was partly due to technical problems, but also to learner reticence in contributing to the online discussion.

Several of the interviewees spoke of the difficulties that some learners experienced in getting online. At his university, respondent 11 (university designer/deliverer) spoke of the push to attract off-shore participants whose access to technology is limited. Respondent 5 (TAFE manager) has to factor in the issue of low bandwidth for learners in her region, a situation which restricts the use of chat facilities. Respondent 8 (manager private company) urged some caution with online learning and communication for the workplace, citing inadequate access to the internet, low-quality hardware and software and lack of time for access at the workplace, as just some of the issues to consider.

Anderson and Kanuka (1997) record that some learners feel that communication online was more difficult than face-to-face communication. This might be a factor to take into account before considering whether to include the assessment of the quality of online communication as part of the overall course mark. Respondent 14 (university deliverer) highlights the fact that learning online requires a different set of skills which a learner needs to develop in order to learn effectively. She asserts that learners need to be supported in their quest to learn these processes as well as the core skills within their learning program.

Harper et al. (2000) noted that respondents to their survey of online education and training practitioners considered the use of interactive communication tools as an important aspect of online learning. However, respondents also said that interactive communication tools were underused. This was due to several reasons, including the need for teachers to have good facilitation skills to help focus the online discussion and the added demands on learners' and teachers' times when online interaction was included in the delivery. Respondent 6 (TAFE designer/deliverer) spoke of the problems associated with online interactions. Some teachers used interactions in a restrictive way that did not allow for much discussion. The learner was required to complete work and email the teacher for feedback. Respondent 6 also noted this phenomenon, as well as mentioning the difficulty of introducing the notion of online delivery to the majority of teachers, stating that 40% of staff at his college did not use computers and 25% did not know how to use computers. Several interviewees recommended adequate staff training before delivering online courses.

Respondent 4 (university deliverer) uses online learning in a graduate medical program. Learners are given a case study to examine and a series of questions to answer. To gather the relevant information, learners must interact and collaborate through a forum with their fellow learners and with academic staff. In this way, the interaction is an integral part of the learning process and not an adjunct to it. Similarly, respondent 2 (university designer/deliverer) manages an online role play as part of a course on Middle Eastern politics. The learners become the critical characters in the Middle Eastern landscape and learn through their interactions with other players. Again the interaction and communication are integral to both the learning and assessment tools within the learning module, not just an add-on.

During the critiques and information sharing within a law class (respondent 6, TAFE designer/deliverer), the learners' interactions and contributions were assessed. However, the learners were engaged in a process of learning by challenging statements and expanding on issues raised throughout the discussion. As part of the fact-seeking explorations in the medical case study scenarios (respondent 4, university deliverer), learners' investigative and interrogative skills were being assessed. However, once again, the development of a deeper understanding of the relevant subject knowledge was being enhanced.

Respondent 3 (university deliverer) outlines the use of an authentic scenario where learners have to research and produce a solution by collaborating online. He comments that it is not just the problem which is being developed and assessed, but also the key competencies of communication, team work and collaboration which are critical to the assessment event.

This raises the critical issue: What is actually being assessed when using online interaction and what is the unit of measurement?

Certainly, many of the interviewees commented on the fact that the online communication and collaboration between the learners resulted in higher-order thinking. That is, the fact that online interaction took place was the reason for higher-order thinking. Respondent 3 (university deliverer) spoke of the richer experience and broader understanding that resulted in the online interactive experience. She commented that the overall class results were similar whatever the delivery mode. However, there was broader understanding of the subject matter when the learners were part of the online interactions. Respondent 11 (university designer/deliverer) agreed that recognition and reward should be give for time learners spent online.

Bunker and Vardi (2001) describe the findings of early adopters of online learning. They note that some lecturers found there was variability in the use of discussion boards, both in quantity and quality. 'When no specific tasks were required, very little use was made of them' (p.114). Some lecturers found their way around the problem by designing tasks requiring interaction and discussion. In some cases learners were asked 'to comment critically and appropriately on a limited number of topics over a longer period of time' (p.114). Discussion was 'extended and improved' (p.114) when this occurred. Likewise, requiring learners to post a 'thoughtful piece of work and then respond to other learners' questions and comments on it' (p.114) led to more thoughtful interactions occurring.

Bunker and Vardi (2002) synthesise their findings and discuss best practice in teaching learners to communicate effectively online and encouraging learners to participate in online discussions and activities. To encourage the use of discussion boards, Bunker and Vardi suggest that teachers:

- Design tasks that require an initial thoughtful posting. For example: case study analysis; journal article review; justification of a stance taken on an issue, solving a dilemma.
- Require students to respond thoughtfully to initial postings. For example: by posting a critique or an opposing view; by using information from the board postings to complete an assignment for submission.
- Assign marks to the tasks.

(Breaking the Barrier Online Website, Curtin University of Technology)

Respondent 15 (university deliverer) uses a portfolio system as a mechanism to gather and respond to student work. She allows her learners to select whatever type of communication they think appropriate. She asks her learners to produce the equivalent of a 500-word response to a question which can be comprised of text, bullet points, PowerPoint, web pages or whatever.

Macdonald (2000) incorporated online interaction into assessment in the following ways:

- learner reflection on issues debated online incorporated into assessed essays
- learners drawing on evidence from online contributions in order to illustrate course issues
- learners summarising readings on online collaboration and posting and discussing their summaries online
- online discussion of an assigned topic in a small group, then each learner summarising the discussion. (Macdonald 2000, section 4.2.5)

Respondent 11 (university designer/deliverer) states that the learners would not take part in the discussion online if it was not assessed. Respondent 16 (university deliverer) states that at least 25% of the learner mark is given for drawing on the discussions which come from the online activities. If learners do not take part in the discussions, they have great difficulty completing the assignments.

Peters and Britt (n.d.) discuss the difficulty in identifying rubrics for analysing online postings/interactions by learners. MacKinnon (n.d.) provides a list of criteria she has seen used in assessment in asynchronous environments:

- frequency of original contributions to the online discussion
- frequency of qualitative responses to others' questions/comments in the online environment
- demonstration of 'higher-order' or critical thinking (ie the ability to converge the thoughts and contributions of others into a new thought or summary). (MacKinnon n.d.)

Creanor (2000 cited by McAlpine & Higgison 2000) used the following criteria to assess quality of contributions:

- presenting new ideas
- building on others contributions
- critically appraising contributions
- coherently summarising discussion points
- introducing and integrating a relevant body of knowledge
- linking theoretical discussions to own experience.

(Creanor 2000 cited in McAlpine & Higgison 2000)

Several case studies examined by McAlpine and Higgison (2000) attempt to measure the quality of contributions, and each suggest a different method. Macdonald (2000 cited by McAlpine & Higgison 2000) uses a system whereby learners had to link contributions in the online discussion to other assessment activities. In other words, learner contributions had to reflect readings and assignments completed, and often involved summarising work they had previously read or analysed (Macdonald 2000 cited by McAlpine & Higgison 2000).

Phillips (2000 cited by McAlpine & Higgison 2000) used a system of categorising forum messages according to quality. To get top marks, learners only had to post two messages, but they had to be of high quality (Phillips 2000 cited by McAlpine & Higgison 2000, p.20).

One of the critical issues repeated throughout the interviews was the emphasis on the creation of totally integrated assessment and learning. Assessment was seen as part of the learning process, not just as an adjunct to measure performance. During role plays (respondent 2, university deliverer), the learners may be assessed on their interaction and contribution to the role play process, but the interaction and absorption into the role was an integral part of the learning process itself. Further summative assessment took place after the role play was completed.

Summary

Two strategies for incorporating and assessing online communication have been outlined in this section.

One strategy integrates online communication fully into the learning context. The activity is driven by the interactions taking place between learners and the mentors. When this strategy is used, the issue of measuring learner participation as part of the assessment strategy is not necessarily relevant. Communication becomes an integral part of the whole process rather than an adjunct. Role plays, authentic team-based problem-solving and investigative problem-solving all use communication as a fundamental component of the learning and assessment process.

The second strategy focusses on using communication for discussion, online participation and peer review. Although these communication techniques contribute to the learners' understanding of the subject matter, the learner may not view their participation as critical to the learning process and may not consider participation as critical. In this case, giving credit towards the learner's overall mark for active participation in the selected communication process will persuade and encourage the learner to engage in the process.

Interactivity and communication between learners and mentors can be developed further within the context of the course material. When the communication is to contribute to the overall course assessment, the criteria for measuring the communication process must not only reflect the overall aims of the course, but also be stated clearly to learners at the start of the course.

The following guidelines may be of use when developing assessment based on online interaction:

- Be sure that the communication being assessed is a component of the products or processes being developed in the course.
- Be explicit to learners about the value of interaction to the learning process.
- Provide clear guidelines and assessment criteria to learners before learning begins.
- If possible, involve learners in setting assessment criteria.
- Where relevant, incorporate peer assessment.
- Link assessment criteria for online interactions to the completion of other assessed or non-assessed activities such as the synthesis of ideas from readings.
- Design a system for categorising responses according to how closely they approximate desired or expected responses.

Creating valid authentic online assessment

Creating valid authentic assessment is particularly important in the VET sector, where assessment needs to allow for the demonstration of competence against industry standards. Within the traditional face-to-face assessment mode, this requirement can create obstacles and difficulties that teachers struggle to overcome. In the online environment, the difficulties surrounding the development of an authentic environment are magnified. For many, the answer has been to select face-to-face assessment strategies combined with online delivery. Others are trialling innovative uses of the technology to simulate workplace conditions.

McLoughlin and Luca (2001) note that the constructivist pedagogical paradigm is gaining ground in university education, particularly in the area of online learning. One of the hallmarks of constructivist learning environments is the focus on authenticity in all aspects of the learning process, including assessment. McLoughlin and Luca note that:

> Authentic or performance assessment … enables both process and product knowledge to be assessed, supported by communication channels for group work, reflection, higher-order thinking and self-directed learning. (McLoughlin & Luca 2001, p.421)

Online technology provides a myriad of opportunities for communication channels to be established and used effectively. Discovery learning in medicine and pathology through case studies allows learners to identify the areas of study which they need to develop further. Learners explore their subject area through interrogation of data banks, mentors and collaborative investigation with fellow learners (respondent 10, university designer/deliverer and respondent 4, university deliverer).

Velan and Kumar (2000) use QuestionMark, Perception, and WebCT to create a range of authentic online assessment activities for medical students. Fourth year students are involved in online case studies that require students to synthesise information and critically analyse the investigative process in terms of costs, benefits and relevance to management.

Exploration and authentic learning is not limited to high-level online communication skills. Respondent 1 (enterprise manager) describes how employees regularly spend time in an online simulated environment where safety issues can be explored without endangering staff or the public. They use drag and drop images of trains and signals to replicate the workplace environment.

Ip and Linser (1999) discuss the use of a web-based role play simulation generator useful in a range of areas such as language learning and political science. According to the authors, the use of a simulation generator:

> … empowers forward looking, innovative lecturers to experiment with creating simulations and getting the students to interact, collaborate, discuss, lobby and practise the skills and theories demanded by their field of study. It empowers educators by reducing the dependency of the academic on the technical staff. (Ip & Linser 1999, p.3)

Respondent 2 (university deliverer) uses an interactive role play scenario where players around the world can engage in learning about issues in Middle Eastern politics. The role play attracts learners with disparate skills and interests, such as a recent intake of engineering students who learnt through their role play experience how politics could potentially affect the outcomes of an engineering contract.

In some cases the use of online technology for the development of simulations is far more appropriate than attempting to assess the same situation in face-to-face mode. Respondent 1 (enterprise manager) has safety issues to consider that make trying out and learning in a real workplace difficult. In a simulated work environment, learners have the opportunity to make mistakes that will help them learn without endangering life. The same is true for respondent 10 (university designer/deliverer) where the learners' health and safety is an issue when they investigate the pathology of disease. In this case, the online environment gives learners the opportunity to view and identify diseases that they might otherwise have to view as static images in books.

Electronic portfolios are becoming an increasingly popular form of authentic assessment in many online learning environments. The American Association of Higher Education (AAHE) website identifies a key feature of electronic portfolios: the opportunity for continuous reflection on and updating of learning. In addition, the website provides examples of electronic portfolios which illustrate their applicability to a wide range of discipline areas, including the humanities, business studies, such as management, and science-based studies such as nursing. Other authors also provide examples of the successful use of electronic portfolios (Bowie et al. 2001; Waugh, Levin & Buell 1999; Russell & Butcher 1999)

Portfolios are being used by practitioners as both a means of posting a range of evidence for assessment and individual feedback (respondent 15, university deliverer) and as a way of allowing students access to other students' work so they can share ideas and resources (respondent 19, university deliverer).

A number of tools exist to make authentic assessment in the online environment as easy to set up as possible. For example, the University of Washington uses the Catalyst Toolkit, a set of web-based tools 'specifically developed to enhance student learning through collaboration and communication' (University of Washington).

Authentic electronic assessment tools within the Catalyst toolkit include MyPortfolio, a tool for creating electronic portfolios; VirtualCase, a tool for creating case studies for problem-based learning; E-submit, a tool that allows assignment submission without using email attachments; and Peer Review, a tool that provides a forum for peer review and comment on a whole work, as well as single paragraphs and sentences. Another part of the toolkit, WebQ, allows the creation of online surveys, questionnaires and quizzes using a variety of question formats. Images, diagrams and simulations can be included.

Torrens Valley TAFE in South Australia has developed a module called Soldering online. The college provides remote self-paced instruction in Hand skills via video link and online learning which incorporates remote demonstrations and practical assessments on close-up video. This module provides a model for teaching and assessing practical skills online.

Kendle and Northcote (2000) note that programs such as WebCT and Top Class can be used to create assessment tasks which include online collaboration between learners. They also give the example of the RonSUB online assessment tool discussed in Oliver, Herrington and Omari (1999) that allows groups of learners to submit and discuss short responses to weekly problems.

Respondent 9 (university designer/deliverer) provides groups of learners with an authentic real-life problem. They must research, question key stakeholders, share, work as a team, communicate and collaborate in order to complete the task. Respondent 17 (university designer/deliverer) sets a series of problems to which solutions must be found. Three teams of learners review and comment on each solution before a tutor also reviews the solution. The result is a series of issues, comments and assessments from different sources for a variety of problems.

Lecturers at Adelaide University have developed the 'virtual Gallery' (vGallery) to encourage authentic assessment in disciplines where peer review is common. The vGallery can be configured by the lecturers (called curators) to allow for peer and self-assessment, as well as assessment by the teacher. A number of different types of feedback are possible, including simple numeric scoring, keyword grading, criterion-referenced scoring and free text feedback (Woodbury, Roberts & Shannon 2000).

Bucolo, Hayes and Foss (2001) discuss the use of an 'E-Journal' to provide authentic online assessment for learners in design and engineering disciplines. The E-Journal involved the re-organisation of a unit titled Fundamentals of synthetic environments into six 'online journal editions'. The following sections were included within each edition of the e-journal:

- feature article (lecture content presented both as a web summary and an expanded PDF document)
- letter to the Editor (a re-worked discussion list in which students were required to comment on a particular issue of the feature article)
- online tutorial (traditional tutorial content provided online with additional face-to-face tutorials being provided every alternative week)
- online case study (developed by groups of students and presented as part of the journal).

(Bucolo, Hayes & Foss 2001, p.18)

Brown and Drinkwater (2001) also provide an example of authentic assessment in a mining subject, Process simulation and control. WebCT was used to create realistic scenarios where learners had to 'apply their understanding of "practical control"' (p.14), manipulate variables and check outcomes. Summative assessment events were submissions relating to a case study that posed 'a real problem likely to be encountered in the workplace' (p.15).

Chambers (2001) discusses authentic, problem-based assessment used in a subject called IT in primary schools in a teacher education course at the University of Melbourne. The subject website contains a detailed description of a fictional school, including 'budget documents, information technology skill profiles of staff members, and a plan of the school' (pp.26–7). During the subject, learners have to solve several problems collaboratively that arise at the school in the area of information technology, and then report back to the rest of the group on their recommendations.

Holmesglen Institute of TAFE is in the process of developing a 'time-based simulation of a horticultural nursery providing learners with a living, breathing nursery that they are required to help manage' (Holmesglen Institute of TAFE). The project team is planning to build in features that will test learners' ability to 'handle different situations or manage a major crisis'.

Summary

The respondents have shown that there are ways to develop authentic assessments based on strategies, such as investigation of real problems in a collaborative environment, using learner teams to assess and review different solutions, and by integrating exploration and investigation into the assessment task. Portfolios offer a way to build readily accessed sets of resources which are easily assessed and can be used by learners when seeking jobs or promotions.

Learning to share knowledge and information and building team skills are part of the authentic learning process, as are communication, negotiation and collaboration skills. Building these key competencies into the assessment process mirrors the skills required in the workplace and adds a measure of authenticity to any form of assessment.

The key principles for the development of quality assessment offline apply equally to the online environment. The assessment must be valid and there is a need to gather a range of evidence. The use of integrated on and offline assessments may reduce the difficulties in developing authentic assessments.

Assessing learner readiness for online learning and assessment

In many online learning situations, there will be a wide variation in learner readiness within the learning community. Some learners are ready for online learning while other learners are not. Learners who are ready generally demonstrate time-management skills, previous experience with computers and self-confidence in the learning environment. They also display higher levels of motivation.

The literature review revealed that the online environment is not currently being used to a great extent to provide recognition and diagnostic assessment for prospective online learners. Education and training organisations need to provide relevant, time- and cost-effective, and appropriate learner-centred learning.

Many online learning deliverers have commented on poor retention rates in online learning situations, as well as difficulties experienced when working with learners who are not ready for online learning.

Assessing learner readiness for online learning includes the following areas:

- assessment of computer/web literacy/skill level
- assessment of key competencies (literacy/numeracy, English/mathematics, communication, problem-solving, organisational skills, technology skills)
- assessment of specific skills/knowledge required as prior knowledge to successfully completing the course including an ability to cope with online assessment
- assessment of learning to learn/lifelong learning skills and attitudes such as time-management, research skills, motivational factors.

Choy, McNickle and Clayton (2002) discuss the need to increase the opportunities for online pre-course assessment for learners wishing to enrol in an online course. They note that there is little opportunity for learners to test their own skills before undertaking an online test. When asked what services they would recommend as part of online learning, teachers highlighted the need to assess learner readiness for courses in several skill areas such as in the key competencies and in computer and internet literacy skills (Choy, McNickle and Clayton 2002).

Brennan, McFadden and Law (2001) provide a comprehensive discussion of the different backgrounds and skill levels different learners bring to the online learning environment. They also identify preconditions to improve learner outcomes that have been noted in the literature:

- students have some knowledge and confidence with the technology (Misko 2000)
- students are independent learners with well-developed levels of intrinsic motivation (Misko 2000). (Brennan, McFadden & Law 2001)

If online course deliverers are to ensure that these preconditions exist, learner assessment prior to commencing online learning is critical. Once common gaps are identified, structured activities can be developed and delivered online to address those gaps prior to enrolment in online courses.

Respondent 52 (TAFE instructional designer) questions the readiness, generally, for learners to tackle an online learning environment. She states that online learners need to have well-developed skills in time management, self-confidence, previous skills with computers and a level of motivation. Respondent 12 suggests that appropriate online induction, skills analysis and support would improve learners' chances of success with online learning.

From the literature, McLoughlin and Marshall identify four skills/cognitive abilities that are essential for effective online learning, and which must not be assumed. The skills/abilities they identify are:

- articulation (being an aware learner–metacognitive awareness of own learning)
- self-regulation (being able to plan one's study and adjust strategies to achieve desired outcomes)
- a repertoire of learning strategies (being able to plan and implement a range of strategies such as note making, analytical reading, critical processing, attention to task, concentration and self motivation)
- self-assessment/self-evaluation (being able to anticipate problems and areas for improvement; being able to ask for help when needed). (McLoughlin & Marshall 2000)

McLoughlin and Marshall suggest strategies for developing these skills within the online learning environment. However, as stated by respondent 12, it may also be useful to develop a pre-course assessment that could have two purposes:

- to alert learners to the types of skills/abilities required in online learning
- to indicate to teachers the level of support/explicit instruction they may have to include in their online learning course.

Respondent 46 (TAFE manager) uses a questionnaire to gauge new learners' experience and provides extra support during the first stages of the course to give learners contextualised, relevant assistance.

Overseas experience reinforces the Australian experience. Those learners without basic computer skills will need to develop these within the online learning course. Again, using a pre-course assessment to determine skill level could be useful. Such an assessment could be coupled with a self-paced learning package to bring all learners up to an equivalent level prior to course commencement.

Cashion and Palmieri (2002) noted that online educators see the need for a range of support services for learners involved in online learning. These support services include induction processes and pre-enrolment support, both of which could provide the opportunity for self and/or teacher assessment of learner readiness for online learning. However, for learners to succeed in new forms of assessment, they also need specific opportunities to practise these methods in the online environment.

The Flexible Learning website <http://www.flexiblelearning.net.au> contains a number of useful references on the issue of assessing learner readiness for online learning. Wide Bay Institute of TAFE in Queensland is developing a web-based 'skills assessment for computer based learning' resource. This resource will be platform-independent and able to be accessed from a web-based server, an intranet or a CD-ROM. The resource will allow learners to identify the skills and knowledge they currently have, as well as any they might need to develop in order to participate successfully in computer-based learning.

According to the paper, 'Good practice benchmarks for flexible learning in the context of the emerging technologies', appearing on the Flexible Learning website, good practice includes the provision of 'programs that assist learners to use the online system, and develop information literacy'. These programs could well be delivered as a front-end, self-paced package attached to online courses.

Summary

There is recognition that more is required of learners to be ready for online learning than the ability to use a computer. Skills in time management, motivation and organisation have been identified as important key skills for maintaining the level of focus needed to successfully complete an online learning program. Pre-course assessment is useful to assess learner readiness coupled with online or other support strategies to help learners develop requisite skills for the online learning environment.

For learners to succeed in online assessment, they need:

- clear instructions about what is required of them in the assessment plus the ability to question the assessor for advice and instructions
- opportunities to practise using the chosen assessment methods.

The use of blended delivery and assessment strategies may help introduce learners to a more independent learning environment in a supportive manner.

Time and resource management for online assessors

Many respondents for this research raised the issue of the time and cost involved in the design, delivery and management of online learning and assessment. Two particular areas of concern have been online assessment development and the areas of marking and giving feedback.

Respondent 17 (university designer/deliverer), respondent 18 (instructional designer private company) and respondent 20 (university deliverer) comment that it takes time to develop online assessments, and to align the assessments with the course content. However, they agree that the actual assessments are much quicker once the online assessment banks have been developed.

White and Davis (2000) examine the issues involved in creating large-scale data banks, and suggest that commercially available data banks will become increasingly available in a wide range of discipline areas. Respondent 4 (university deliverer) speaks of developing data banks and is exploring the possibility of sharing data with universities overseas.

Interestingly, those using online resources and assessment strategies speak of the increased time and cost associated with developing and designing the online environment plus issues such as maintaining technical support and infrastructure to allow online assessment (respondents 3, 5, 17, 20 and 21)). This is particularly true for multiple-choice questions where not only the questions need to be developed, but also full explanations of why answers are either right or wrong, need to be devised to provide useful and timely feedback and direction for the learner. Once set up, there is agreement that the online assessment process can be cost- and time-effective (respondent 20).

There are a number of software products available that can automate assessment design, construction, delivery and management. Some of these products can be used with objective as well as subjective tests, such as case studies, essays and role play simulations. Existing online course management platforms enable teachers to create automated objective assessment events for use in formative and summative assessment.

Providing feedback

Choy, McNickle and Clayton (2002) highlight the importance of providing timely feedback to learners. In their interviews exploring learner experiences with online learning, the following three factors were seen by learners as being most critical to successful course completion:

- Regular contact with teachers and tutors
- Quick responses from teachers and tutors
- Regular support for learning. (Choy, McNickle & Clayton 2002, pp.35–6)

One learner commented: 'feedback between learners/teachers to be no longer than two days—frustration and lack of enthusiasm seeps [sic] in after that'. While this level of expectation might be unrealistic for many online courses, the comment highlights the need for teachers to plan effectively, manage their time carefully, and above all, communicate realistic expectations and time frames to learners early and often.

In their discussion on managing assessment loads, Morgan and O'Reilly (1999) reiterate the importance of planning. They suggest capturing all commitments in a single schedule so that potential problem areas will be clearly visible in advance. They also suggest providing online/open/distance learners with sample timetables for carrying out their study and assignments.

Teachers need to plan to give feedback to their learners in a manner that matches their workload, selecting specific deadlines each week for reply within a set timeframe. Charman and Elmes (1998) offer useful recommendations for effective feedback to learners after formative computer-based assessment events, some related directly to time management.

Teachers need to communicate the assessment and feedback strategy clearly to the learners so that there is no misinterpretation and misunderstanding of the process.

Curtain (2002) suggests the use of automated response systems to reduce time spent dealing with individual queries, but also staff management strategies such as using a single point of contact for learners so they can develop an ongoing relationship rather than swapping between a number of staff.

A number of authors discuss the use of self and/or peer assessment that could offer teachers considerable time savings if concerns about quality of the judgement could be addressed. Crockett and Peter (2002) have used the online environment to develop teamwork as a professional skill. Using peer assessment, they report that:

> Students appear to have adopted more appropriate learning strategies, the tutors are definitely happier with a substantial reduction in the pressure generally associated with tutorials stemming from a system which discouraged student participation, and indirectly encouraged tutors to do most of the work. (Crockett & Peter 2002)

These methods are explored earlier in this report.

Automated feedback for formative assessment is now very common in the online environment and can greatly assist with effective time management. Respondent 10 (university designer/deliverer) uses a web server to give learners instant feedback for online tests.

According to McAlpine and Higgison (2000), case-study participants agreed 'that automatic marking, although problematic, could improve the quality of testing, both through item analysis, and through regular, if brief feedback'. Several interviewees mention the use of immediate feedback for learners by setting simple multiple-choice and tick-box questions as methods of monitoring progress for learners (respondents 10 and 11, university designers and deliverers).

Dalziel and Gazzard (1999) acknowledged that immediate feedback could help direct learners to areas of the syllabus that they had not explored in sufficient depth. By allowing learners to self-assess through automatically marked multiple-choice and short-answer questions, learners could self-direct their focus of study (respondents 6,16,18 and 22).

As a further means of replying to bulk emails, teachers can use a FAQ (frequently asked questions) page to print commonly asked questions with standard replies. This saves time for both teacher and learner and can be accessible to learners 24 hours per day, 7 days per week.

However, respondent 22 (university deliverer) prefers to think of the assessment process as one of guidance as opposed to feedback. This view supports the constructivist approach to learning where the teacher is a facilitator or mentor in the learning process rather than the driver of learning. Respondent 21 (university manager) cites the issue of lecturers being wary about introducing a system of automated assessments due to the expectation that computers will take over their jobs.

The use of appropriate software could also positively impact on the time management of instructors. Salter (2000 cited by McAlpine & Higgison 2000) discusses the availability of software tools to assist in the measurement of higher-order skills. Salter quotes the findings of other authors in describing some of these tools (for example, Bocij & Greasley 1999; Kjollerstrom & Martensson 1999). Tools include those that assign marks to essay-style questions on the basis of key words, phrases and statements and those that assist in the assessment of portfolios.

Twomey, Nicol and Smart (1999) suggest finding out whether the textbooks used in online courses have commercially available item banks associated with them. Burstein Leacock and Swartz (2001) discuss the use of 'e-rater' and 'c-rater'. According to Burstein, Leacock and Swartz:

> E-rater is a software application designed to produce holistic scores for essays based on the features of effective writing that faculty readers typically use: organisation, sentence structure, and content. The e-rater software is 'trained' with sets of essays scored by faculty readers so that it can 'predict' the holistic score a reader would give to an essay.
>
> (Burstein, Leacock & Swartz 2001)

Burstein, Leacock and Swartz state that e-rater has been used in scoring over 750 000 high-stakes essays from the Graduate Management Admissions Test. According to Burstein, Leacock and Swartz (2001): 'E-rater scores show only a three percent discrepancy rate with a single human reader … the same discrepancy rate that occurs between two single human readers' (Burstein, Leacock & Swartz 2001).

O'Leary (2002) on the University of Bristol's web page Learning Technology Support Service describes TRIADS (TRIparatite Assessment Delivery System) which is a sophisticated assessment design system developed at the University of Derby. This system:

> can incorporate images, video and audio into questions, and take answers from one question to formulate the next, as well as give detailed feedback and link to further resources.
>
> (O'Leary 2002)

The use of such systems such as TRIADS and software such as described by Salter, and Burstein, Leacock and Swartz may be helpful in reducing teacher time spent in marking assessments and providing feedback to learners, even in cases where assessment involves the demonstration of higher-order skills.

Summary

The development of online assessment can be time-consuming, particularly the select-response methods which test knowledge such as multiple-choice, true/false. Once developed, these items are easier to maintain and administer. There is a range of tools available for developing games and quizzes online. Select-response methods such as multiple-choice, true/false may only be a shallow measure of knowledge, but can easily cover a broad range of topics. However, before developing a multitude of technology-driven assessment tasks, it is essential that the assessment designer examines the purpose and aims of the learning to ensure that the assessment is appropriate to the skills, knowledge and attitude to be assessed.

Administratively, online assessment is easily tracked and recorded. In large classes, online automatically assessed multiple-choice questions offer the advantage of easy administration by the teacher and easy access by learners either off or on campus at a time convenient to them. However, the danger in choosing the methods for their ease of use is that they may not actually assess what is intended to be assessed.

Provision of constructive, instructive feedback to learners is critical. There are many complaints from teachers about having to respond to learners' emails at all times of the day and week. Once set up, there is agreement that the online assessment process can be cost- and time-effective (respondent 20). Teachers need to develop clearly stated expectations upfront to help manage their time and consider technological solutions to assist where available.

Providing online support for online assessors

The need for professional development for online assessors/educators is well documented in the literature. Assessors in all environments need the opportunity to discuss their approaches, but more specifically as a requirement of the Australian Quality Training Framework, 'to review, compare and evaluate their assessment tools, evidence and judgements'.

It would be useful to be able to take advantage of the online infrastructure developed for learning so that it could be used by assessors both for formal professional development and also for sharing resources, ideas and problems. An assessor network could be useful in sharing information that could assist online assessment developers and deliverers to save time and money and to continually improve their practice.

The crux of this issue is the resourcing required to establish and maintain a community of expert practitioners along the lines of the Computer Assisted Assessment Centre (CAA Centre) in the United Kingdom. This centre became a focal point for discussion and professional development on online assessment issues. Projects conducted under the auspices of the centre included the Online Tutoring E-book and annual conferences focussing on online assessment.

Low-cost mediums for networks such as listservs do exist. They are an important support mechanism for people with similar interests or experiences from around the world (see ITForum: a Listserv for the Instructional Technology Community <http://it.coe.uga.edu/itforum/home.html>). Discussions relating to instructional technology are illustrated by examples from a range of countries and international experiences. However, a more interactive tool might provide a bank of data encompassing resources, principles, hints, techniques and methodology that assessors could both contribute to and borrow from.

There is evidence from the interviews that a range of mechanisms for sharing and validating resources are already in existence. Respondent 6 (TAFE manager) talked about the development of online access to a database of assessment tasks and strategies linked to training packages available to teachers throughout her region. The material will go through a validation process and will be tagged as such. This is seen to be helpful to teachers who are often uncertain about complex packaging rules detailed in the training packages.

One issue with developing a central network is that of sharing information and intellectual property. Vast amounts of assessment materials are already available online through various websites. Gathering and validating the information from publicly accessible websites such as the following websites would be an excellent starting point:

- National education website: <http://www.education.gov.au/>
- National Assessors and Workplace Trainers site: <http://www.nawt.com.au/index.html>
- Rural Training Council of Australia's site: <http://www.rtca.com.au>
- Curriculum Council of Western Australia: <http://www.sea.wa.edu.au/>
- Reframing the Future: <http://www.reframingthefuture.net/overview.shtml>.

Other websites containing useful information for assessors in specific industry areas also already exist.

The notion of VET teachers sharing resources throughout Australia on one collaborative website would seem logical. However, respondent 44 (designer/deliverer private company) speaks of the interstate antagonism that she encountered when seeking funding to design and develop an online assessor network that would be developed with input from several states. A number of centres around Australia are currently trialling methods to assist assessors to communicate online about issues relating to their work and the assessment process.

An online assessors' network has been trialled in Western Australia in 2002. The network includes 260 member organisations from across industries and sectors. It is locally driven and centrally supported by the Western Australian Department of Training. (Further information is available from <mairead.dempsey@training.wa.gov.au> [08] 9235 6805.)

The network hosted a chat room facility, discussion board and email facility. It was important to make it easy for people to access the online communication platform. Online tools such as automated member recognition enabled an immediate customised response. Email communication was used to support and encourage members to use the online site. The network now has an internet website with a direct hyperlink to the new site.

The network needed ongoing facilitation to sustain it and to expand the discussion. Members have discussed areas related to specific training packages which has allowed the development of:

- opportunities for peer review of assessment resources
- self-assessment guidelines for assessors.

Structured teacher professional development for delivery and assessment online might also be an area to be investigated. For those about to design and deliver online training and assessment, an online course may help prepare them for the complexities of the medium. Respondent 43 (TAFE manager) delivers online training to future online designers and developers. The notion of online training was supported by respondent 6 (TAFE designer/deliverer), who mentioned the difficulty of introducing the notion of online to the majority of teachers. Forty per cent of staff at his college did not use computers and 25% did not know how to use computers. The need for adequate training was supported by several interviewees who recommended adequate staff training before delivering online courses.

There is perhaps a need for further research or an issues paper examining the feasibility of providing ongoing resourcing for maintaining a professional network, which would include conferences specific to the issue of online assessment, banks of validated assessments and strategies for incorporating online assessment into both face-to-face and online delivery.

Summary

The online medium can and is being used to support assessors in their work. Organisations offering online courses could provide more support to assessors through using their online facilities and professional development. Assessors need professional development and an online environment would provide the ideal medium for learning.

Cheating—ensuring authenticity of learner performance

Many authors and practitioners have raised the issue of how to ensure that learner performance in an online assessment event is actually the learner's own work and does not include plagiarism or cheating.

Education and training institutions have developed a range of policies and procedures to prevent and/or punish various forms of plagiarism or cheating in assessments. However, assessing learners online means that some of the procedures used to minimise plagiarism and/or cheating in the face-to-face environment are not able to be used.

In the online environment, as well as in the face-to-face teaching/learning environment, there are two perspectives on the issue of verifying or authenticating learner performance. Is the pedagogy a teacher/credentialist paradigm, or a learner-centred, lifelong learning-focussed paradigm? In the former, identifying and preventing instances of plagiarism or other forms of cheating are primary concerns. In the latter, nurturing and harnessing intrinsic motivation for learning are primary concerns.

Many technological tools to address these problems currently exist and others are in development. Careful consideration of assessment design is also raised as a solution to this problem.

The WebCT site has three sections within the topic area of 'Academic honesty: combating plagiarism and cheating'. The first section provides a range of teaching strategies to combat plagiarism and educate learners. The second section provides a list of anti-plagiarism websites and software, and the third section discusses how to minimise cheating in online exams.

In 2001, the Joint Information Systems Committee in the United Kingdom completed a four-strand project on the electronic detection of plagiarism. One intended outcome of the project is the establishment of a plagiarism adviser service, which is to include a detection facility. The Joint Information Systems Committee website provides the executive summary of the project, outlining the methodology and outcomes of the electronic detection project. In addition, the website provides relevant briefings and reports for download, and a list of sites in the United Kingdom and United States for detection of plagiarism.

The project findings provide food for thought:

> It became clear during the project and subsequent dissemination workshops that the solution to the problem of plagiarism is prevention and that this solution can and should come from within an institution, not from a detection product. (Joint Information Systems Committee)

The British Standards Institute website provides a media release from 1 December, 2001 that describes new guidelines developed by the British Standards Institute to combat cheating in the online learning environment. The press release provides an excellent description of the credentialist viewpoint when it states:

> When people take exams the stakes are often high, because qualifications are so important to people's progress through life. Although computers are making things more efficient in many areas, their use in exams introduces a whole new set of risks that were unknown just a few years ago. (British Standards Institute)

Whittington, Bull and Danson (2000) discuss the use of encryption to ensure security/integrity of high-stakes assessments. They note the difficulty in reliably authenticating the identification of candidates in remote locations. They suggest that biometrics may ensure authentication in the future, although some interviewees stated that the costs of implementing such a system is prohibitive at this stage.

Guernsey (2001) describes software products that are supposedly 'cheatproof'. One, called Securexam, encrypts tests 'so that they cannot be read by learners until exam time' and 'goes into "lock-down" mode, preventing learners from opening other applications, like Internet browsers, while taking a test'. Securexam 'is designed only to provide security offline—in computer-equipped classrooms and on learner laptops'. A competitor of Securexam, SofTest, is being used in 80 law schools around the United States.

Austin and Mahlman (2000) describe the multiple forms of security used in the online assessment of vocational training in several high schools in the state of Ohio in the United States. Strategies included 'customised passwords that conveyed a range of information about the schools, teachers and learners in 3 sets of digits' (Austin & Mahlman 2000). These passwords could only be used once, on the test date, to ensure the security of the summative assessment event. JAVA applets were used to 'temporarily disable the print and save features of the browsers' (Austin & Mahlman 2000). Electronic trails could be established (although they were not in the testing situation described in the article) to identify users, while 'windows' were used to permit access to the server from specified schools at certain times.

Bennett (1999) offers some insight into the future of large-scale, high-stakes testing. He discusses current developments in test design such as Portal. Portal will incorporate a range of tools that will enable large-scale tests to incorporate 'cognitive-domain principles which would, in the long run, improve test validity, fairness, utility and credibility' (Bennett 1999). He goes on to discuss technological developments in other areas such as the use of a Mathematics Test Creation Assistant for item generation, the use of simulations, games and case-management exercises to improve task presentation, and new methods for scoring constructed responses as opposed to selected responses, all of which may impact on the future of large-scale testing programs.

Williams (2000) believes that the concern about cheating is exaggerated. He suggests the use of 'take-home', 'open-book' online summative assignments as these provide a higher quality of student learning, a more equitable assessment process, especially for students from language backgrounds other than English, less stress for students, a learning experience that more closely represents situations that might happen at work/in the real world, and an emphasis on critical thinking as opposed to a focus on absorbing content.

Williams challenges the 'popularly held view that only formative assessment can be set online because of the problem of invigilation'. He argues that flexible delivery is a student-centred approach to learning, and requires an equally flexible and student-centred approach to assessment.

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Many interviewees used the blended delivery and assessment approach that combined online formative assessment with face-to-face assessment in either a workplace or a simulated workplace (respondents 5, 7, 12 and 16)

Williams describes a flexible assessment system in place for an masters in business administration program at the Brisbane Graduate School of Business: '… this system gives students the choice of completing all, or some combination of a series of optional [continuous] assessment items, or no optional assessment items at all …'. If a student elects to undertake all or part of the continuous assessment process, a computer spreadsheet will automatically select the combination of completed assessments that will give the highest end result for the course. Williams also suggests strategies for dealing with plagiarism within the take-home test context, such as using software to analyse word strings and looking for similar responses amongst students.

Representatives of enterprise-based registered training organisations say that plagiarism and other forms of cheating are not issues for assessment in the workplace context. 'It quickly becomes apparent in the workplace who has completed training programs successfully' (enterprise manager).

Indeed, this sentiment is echoed by other interviewees as seen by the responses outlined in table 13. There is a repeated message that with online contact with learners throughout the length of the topic of study, the teacher/facilitator does get to know their learners much better than in face-to-face classes. That knowledge enables the assessor to determine whether the learner is capable of giving the responses they do in their final summative assessment tasks (respondents 3, 9 and 10). Respondent 17 (university designer/deliverer) maintains that most plagiarism occurs through cutting and pasting from the web. Her answer is to develop a feeling or intuition for the plagiarism, an answer she agrees is hardly scientific yet still effective.

One interviewee (7) stressed the need to collect a variety of evidence to ensure that the assessment was valid. Respondent 17 (university designer/deliverer) sets a series of projects that teams of learners have to solve. Each solution is then assessed and marked by 3 other teams of learners before being submitted to the course facilitator. Since each project is discrete and makes use of a series of peer assessments, respondent 17 suggests that cheating is not an issue. Respondent 6 (TAFE designer/deliverer) believed the issue of plagiarism is blown out of all proportion. He thinks that people are sceptical about the advantages of new technology and plagiarism is one more barrier raised to hinder the implementation of online assessment.

Table 13: Strategies reported to overcome plagiarism by interview respondents

Strategies	No. of times mentioned
Supervised summative assessment	14
Staff knowledge of learners and a 'learning community'	13
Not a concern	11
Large test banks of randomised items	10
Use of employer reports	6
Require passwords	5
Use open-ended assignment	3
Dedicated software for plagiarism checks	3
Student declaration of authenticity	2
Use of face-to-face workshops	1
Staff training	1

For some online designers and deliverers plagiarism is a major issue; however, for others it is not a concern because a range of strategies are in place to ensure authenticity of learner performance.

A significant number of respondents retained a supervised face-to-face summative assessment to report results on learners and another large proportion were confident that, by forming a learning community with their online learners, they could overcome plagiarism problems.

Summary

Several factors related to plagiarism or cheating emerge from the discussions. It is clear that cheating and plagiarism exist whether in an offline or online environment. Teachers need to adopt a risk management approach to the issue of authenticating assessment and make judgements concerning the identification of critical assessments that absolutely must be authenticated as opposed to the assessments where authentication is less critical.

There is a firm belief that the online environment provides a valuable opportunity to get to know individual learners. By knowing their learners, assessors can readily determine whether learners do have the capacity to submit the assessment which has been submitted in their name. This seems to be a better method of combating cheating than the deployment of a range of expensive, high-tech solutions might offer.

A common response to overcoming the possibility of cheating is to gather a range of assessment material throughout the course as evidence of competence. Many teachers are using a blended approach where final summative assessment takes place in a real or simulated workplace. Where the learner must demonstrate competence in the workplace in conjunction with some other form of assessment, cheating becomes evident when the learner is unable to perform tasks to a consistent level.

11 Future directions

Any investigation of the future trends for online assessment needs to consider both advances in technology and the contexts in which assessment is conducted.

Developments for the VET sector will need to include integrated assessment practices to take account of the multimode or 'blended' learning and assessment arrangements and the use of online communication and collaboration in both learning and formative assessment strategies.

Advances in technology may well impact on the design and delivery of assessment possibilities in the future. Trends might include the use of biometrics for security; the use of sophisticated automatic marking software that can mark subjective, open-ended assessments which assess higher-order thinking skills; the use of extended mark-up language (XML) and other programs to tailor learning to individuals; and further developments in the use of online simulations for learning and assessment.

Some of the views from the literature and responses from experienced designers and online educators on future trends for online assessment are outlined in this section.

What the literature says

While much of the emphasis in the literature focusses on the 'current' use of online technology for a range of assessment purposes, some authors have been following the development of computer-mediated assessment practices and predicting or commenting on future uses and developments. These predictions and comments cover a range of themes and many different educational and training settings (Dalziel & Gazzard 1999; Dalziel 2000; Bennett 2002; Bejar et al. 2001; Burstein, Leacock & Swartz 2001).

Developments in technology

Developments in information communication technology can support innovative methods of assessment. Research undertaken by the Educational Testing Service in the United States describes three generations of computer-based tests (see <http://www.ets.org/research/pic/reinvsec2.html>). The first generation is characterised by computer adaptive tests that tailor the sequence of questions to students' answers. The testing program therefore tailors itself to individual needs and skill levels. The next generation tests are characterised by the use of audio, video and animation in the assessment of a range of skill areas and databases which capture and score complex constructed responses and move and manipulate large amounts of data electronically. Problem-based assessment, including open-ended questions, is enhanced in this generation. 'Third generation' computer-based tests involve virtual reality simulations that can model complex environments, giving learners the opportunity to learn and be assessed under authentic, workplace conditions. Advantages of the third generation include embedding formative assessment seamlessly into learning, so that learners may not even be aware that they are being assessed. Some of these third generation tests could be used to assess group projects undertaken in electronic learning communities. In the future, computers will better be able to understand and code speech more accurately, allowing for assessment to be delivered in multiple modes and catering for different learning styles and abilities.

Current developments in automatic item generation are discussed in some detail by Bejar et al. 2001. The use of XML (extended mark-up language) allows the creation of a test delivery system, item generation system, and a database of items and item models. Tests can be automatically personalised for each test taker.

Diagnostic assessment online

Improvements in diagnostic tools are already leading to the development of customised learning programs based on assessment of the learners needs (Drew, Thorpe & Bannister 2002).

Standardised large scale testing

Bennett (2002) and Olsen (2002) discuss the move to online computer-based testing in the United States, particularly for large educational communities. The economies of scale in online technology may encourage the development of large-scale testing. Bennett however, raises a number of issues in relation to equity, fairness and learner access. For example, differences in learner familiarity with technology, hardware, internet connections, platforms and other technical characteristics between and within testing locations may affect test outcomes unfairly. Security and unreliability of the technology are two other issues of concern raised by Bennett. He concludes that the process of incorporating technology into assessment must occur in ways that both preserve and enhance the validity, fairness, utility and credibility of the assessment process.

Simulating 'real world' tasks

Bennett (1999) suggests that, in the future, online tests will more closely assess what people need to know and be able to do to be successful in the real world. He says that computer-based simulation, automatic item generation and automated essay scoring will assist this move to what could be called competency-based online assessment.

What the interview respondents said

Developments in technology

For some respondents, the notion of advancement is embodied in the development of technology. Respondent 50 (TAFE instructional designer) wants to explore the development of creativity in the design of tools. He is concerned that currently, the delivery and assessment methods commonly used are heavily text-based. He wants to see the introduction of more audio, video and graphics into the mix. He would like to explore the development of ongoing online simulations and the use of short, Flash files that could be lodged in online resource libraries and be used interchangeably when needed.

Respondent 50 is currently making use of the technology to send text messages via mobile phone to inform learners of work tasks. A suggestion was made by respondent 56 (university deliverer) that palm pilots could be used to record workplace assessment tasks. This would help address issues relating to management of assessment data and highlights the need for systems and strategies to help assessors manage the assessment process.

Assessment purposes—diagnostic assessment

Respondent 54 (instructional designer private company) predicts greater use of multiple-choice assessment tools that will perform diagnostic testing upfront. This will enable course materials to be contextualised and altered to fit the learner's needs. He views this development as being particularly useful to the corporate sector where time is measured in terms of money—training will be pared down to cover only what the client needs. Complex multiple-choice questions are already being used with positive results to encourage medical students to reason and justify their decision-making processes.

Respondent 48 (university designer) supports respondent 54 in her view that there will be more online assessment used for diagnostic testing purposes and agrees that this is one area that needs more development.

Local developments in assessment

For the Australian VET sector, respondent 55 (TAFE manager) spoke of the need to create more problem-based learning, that is, learning for the workplace that develops higher-order skills. She urges designers to think about the industry/learner/teacher relationship as corners of a triangle with each corner contributing to the learning experience. A number of respondents suggest that problem-based learning has, in many instances, been made simpler by adopting an online environment.

Learners being given real-life problems to investigate in teams not only encounter the financial and bureaucratic constraints of a real situation, but also have to come to terms with the tensions and stresses of forming and performing within a team environment. Added to that, they face the inherent difficulties of overcoming the barriers of online communication and collaboration that would exist between collaborating workplace divisions or organisations.

Assessment and feedback

Respondent 54 (instructional designer private company) mentions developments underway in the controversial area of automated essay marking. He acknowledges that developing online methods to assess practical skills is expensive and suggests that this might have limited application. However, when safety and security are a prime consideration for industries investigating ways to train their employees, the cost of developing simulators may be justified in relation to the safety of staff and clients it can ensure.

Peer review and assessment can add further dimensions to the learning experience. For those facilitating web skills training of any kind, peer review can be easy to organise. Each learner places web or multimedia prototypes or snippets on a web space for review and assessment by the rest of the class group, whether training is occurring in a face-to-face class or in a distance learning mode.

Learning management systems

While many of the major learning management and learning platform systems provide embedded assessment tools, there is a view that these tools may be limiting. Respondent 54 suggests that an emerging trend is the adoption of specialist online assessment systems to complement learning management systems, providing many richer opportunities for assessment and a greater depth of functionality to users.

For learners without home computers, facilitators may have to spend extra time collecting information regarding local sites, a practice which would allow learners ready access to computers. Local libraries, internet cafes and collaborative arrangements organised for access to local colleges and university sector facilities might alleviate access issues.

Summary

Rapid developments in technology and ideas of ever-more interactive teaching and assessment materials drive the visionaries towards the creation of intuitive, custom-designed tools and tasks.

However, the reality at this stage is that not all learners have access to the technology capable of accessing high-end materials. Furthermore, creativity in learning and assessment need not be limited by technology or by lack of technical expertise. The respondents interviewed for this report have shown that simple tools can be the basis for appropriate interactive learning and assessment strategies. More importantly, revisiting the role of assessment and understanding the possibilities of the process to be collaborative and learner-centred are as important as developments in technology. Learning facilitators must be creative with the available tools, blend face-to-face delivery and assessment with online strategies and ensure that assessment is an integral part of the learning process.

12 Key points for assessment in online learning in VET

From the research, a set of key points emerged that support the design and implementation of quality assessment in online learning in the VET sector. These points can be used to help online and face-to-face practitioners develop valid, reliable, flexible and fair assessment:

The planning stage

- Plan upfront how candidates will demonstrate their competence.
- Use the skills and knowledge you have developed for face-to-face delivery and assessment to help guide your choice of assessment tools and strategies.

Developing strategies

- Consider the skills and knowledge that are to be assessed and determine the best methods to collect the evidence. The technology available should not determine the methods used.
- Make assessment part of the online learning process. The learning strategies and assessment strategies should be developed simultaneously.
- Use a range of methods to collect evidence of competence as with any competency-based assessment, whether delivered online or face to face.
- Ensure assessment is valid and authentic by using strategies such as simulation, problem-based approaches, portfolios of evidence and integrating online and face-to-face assessment.
- Consider how the assessment can be learner-centred by using strategies like self and peer assessment.
- Use the online formative assessment strategies to develop key competencies such as communication, collaboration and team work.

Implementation

- Clearly state the criteria for assessment upfront to learners. For example, if quality and quantity of online communications count towards final assessment, be clear about the criteria used for assessing.
- Make sure the expectations regarding the timeliness and extent of feedback from the assessor are clear to the learners from the outset.
- Help eliminate cheating by devising ways to know your learners' abilities and by gathering a range of evidence of competence.
- Believe that simple technology can be as effective as complex technology.
- Make sure you understand the capabilities and access to technology available to your client group. Offer other options if online is going to restrict your learners' access.
- Explore the possibilities of blended delivery and assessment methods. Online assessment strategies can be incorporated into a face-to-face class and conversely, online classes can be assessed using real or simulated workplaces.

Assessor support and review

- Share resources with people in similar fields to help enrich your own materials. Build on your skills and knowledge and keep up to date with the constantly changing technology.
- Use the online environment to review, compare and evaluate your assessment strategies, evidence collected and judgements with other assessors to validate assessment.
- In the online environment, the tools for assessing online and the methods to deliver assessment are often intertwined. The following table is supplementary to the key points and combines both tools and methods in the following grid. It can be used to help guide facilitators plan and develop online, integrated assessment strategies using some simple and other more complex online methods and tools.

Table 14: Online assessment grid

Tool or method	The use and application in online assessment
Email	Use email for receiving and tracking reports, assignments and essays. Return work by email with annotations or, with learner permission, results can be placed on bulletin boards for further discussion or peer review. This is simple and easy to use but make sure all learners have an email account, can use the email tools and have access to a computer.
Online discussion	Include discussion or participation online through chat rooms, forums and threaded discussion. Set tasks for individuals or teams to complete. Get feedback and review from other class members. Facilitators can monitor contributions by learners as a component of the class assessment. If the training organisation doesn't have a learning management system, consider using a shareware product and create your own learning community or start a closed community listserv.
Bulletin boards	Place topics on bulletin boards as the starting point for online collaborative assignments. Post learner work, with prior consent, on bulletin boards for peer assessment, review and comment. Shareware products are available.
Collaborative assignments	Set authentic tasks that teams have to investigate and solve. Learners must use online resources to work collaboratively, share resources and findings. Develop learner communication and team-building skills that are so valued by employers. Use a shareware learning community or listserv.
Self-assessment	Give instant online feedback through questionnaires, multiple-choice questions and even through publication of FAQs. Allow learners to gather the information they need to focus their study in areas that need improvement.
Peer review	Allow learners to review each other's work. Anonymity may lead to more honest reviews. Encourage learners to share their work to build upon the collective skills and knowledge of the group.
Participation in online discussion	Set each learner a discrete area of work to review and explore. Get learners to review, assess and critique the work, adding complexity and depth to the original piece of work. Add controversial statements to a threaded discussion and encourage learner contributions, with the incentive of credit for participation counting towards the overall assessment.
Online exams	Moderate and control online exams with start and stop times, or with login passwords and timeouts.
Online quizzes	Use regular quizzes online for a small component of final assessment. Quizzes can be used as formative assessment during the course, ensuring sufficient skills and knowledge have been attained before attempting a final assessment. Fun quizzes can be used as an introduction to the online assessment environment.
Computer-marked assignments	Set multiple-choice tests as a quick and easy indictor to learner and facilitator alike of the learner's progress. Multiple-choice exams, although able to assess mainly knowledge, can cover a broad range of topics. They are easy to administer to large groups of learners and can be made accessible at a time and place convenient to the learner.
Portfolios	Learning management systems often have portfolio facilities where learners can gather a range of materials appropriate to the course. Facilitators have easy access to learner products and performances, and, if desired, other learners can also access class portfolios to provide feedback and reviews. By keeping track of early efforts, learners and teachers can monitor progress in knowledge, skills, ability or other outcomes.

Table 14: Online assessment grid (cont.)

Tool or method	The use and application in online assessment
Role play	Develop a role play to allow learners to get into the character of the people they are researching. This medium offers the learners a degree of anonymity which allows them to express themselves more openly than they might otherwise do. Learners can take on a role which they can research, develop and act out. They can speak and act in character allowing more freedom of expression.
Simulations	Run a simulation where there is an aspect of safety involved. Students learning to fly large jets, learning to implement large networked accounting systems, or learning to repair and service lifts and escalators might all benefit from a simulation. However, they are expensive tools to design and develop.
Web publication	Encourage learners to write and publish articles and assignments in web-based publications allowing for peer and faculty review. Get help and set up a class web-based journal so that student work can be published and reviewed online. Develop an online FAQ page where commonly asked emails or interesting emails can be addressed publicly.
Web design and development	Allow learners to self and peer assess web design work on the actual web. Publishing their product gives learners a chance to take an observer's critical look at their work. The completed product is also part of the learner's portfolio of work for future employers to view.

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ISBN 1 74096 154 4 print edition
ISBN 1 74096 155 2 web edition

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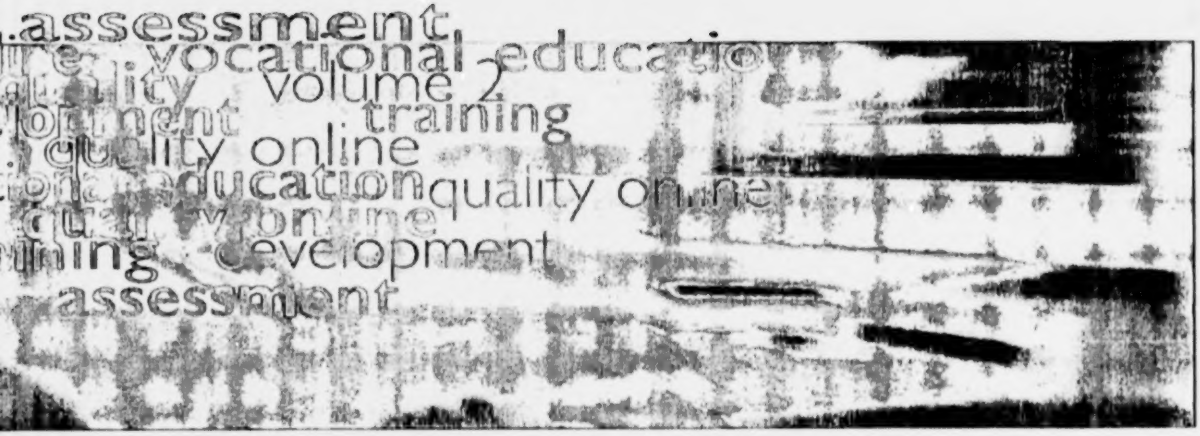
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Australian *Flexible* Learning Framework
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Publisher's note

This report has been organised into two volumes. Volume 1 contains the detailed report of this project.

Background

In August 1999, the Australian National Training Authority chief executive officers endorsed the *Australian Flexible Learning Framework for the National Vocational Education and Training System 2000–2004*. The Australian Flexible Learning Framework has been developed by the Flexible Learning Advisory Group and represents a strategic plan for the five-year national project allocation for flexible learning. It is designed to support both accelerated take-up of flexible learning modes and to position Australian vocational education and training as a world leader in applying new technologies to vocational education products and services.

An initiative of the Australian Flexible Learning Framework for the National Vocational Education and Training System 2000–2004

Managed by the Flexible Learning Advisory Group on behalf of the Commonwealth, all states and territories in conjunction with ANTA

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ISBN 1 74096 156 0 web edition

TD/TNC 73.291

Published by NCVER
ABN 87 007 967 311

252 Kensington Road, Leabrook, SA 5068
PO Box 115, Kensington Park, SA 5068, Australia
www.ncver.edu.au

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Appendix 1
Project Reference Group Membership

Professor Ron Oliver	Professor of interactive multimedia School of Communications and Multimedia Edith Cowan University, WA
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Appendix 2
Interview questions

Question 1: Comments have been made that online assessment (has) questions at the lowest common denominator level and trivialises content knowledge. Can you comment? (Icebreaker question)

Question 2: What factors influenced your choice in selecting the online assessment tool you are currently using?

Question 3: Can you describe your use of online technology to perform assessment?

Question 4: What are the benefits of online assessment for your learners?

Question 5: What are the benefits of online assessment for you as an assessor?

Question 6: What types of assessment are best done online?

Question 7: What are the principles of quality assessment in the online learning environment?

Are they different from to face to face?

Question 8: What are the possible impediments/challenges to achieving quality in online assessment?

Question 9: Have you implemented strategies to account for plagiarism in your assessment practices?

Question 10: Are there any comments you would like to add about online assessment?

Appendix 3
Applying quality online assessment in VET—fictional scenarios

A series of seven scenarios has been developed to help illustrate a variety of ways to incorporate online assessment into VET courses that are delivered both face to face and online. The scenarios can be used for professional development sessions as triggers for discussion, or to illustrate techniques and tips for developing online strategies.

The scenarios have been written as works of fiction to represent situations in technical and further education and private registered training organisations. Any similarity between the fictitious characters and real people is purely coincidence.

Scenario 1

Certificate IV in Business (Frontline Management)

Collaborative online assessment

Harrold and Wai Sim are old friends from university days. Both are now teaching business courses at two separate country colleges 150 kilometers apart, all part of the Westridge Community College Network.

One evening Harrold calls Wai Sim on the phone.

HARROLD: Hi. How are you? I hear you're teaching the Frontline management modules again this semester.

WAI SIM: Yes. It's good to have the opportunity to review your notes and anyway, the new Business Services Training Package has changed the competencies around quite a bit, so there's some new content to develop resources for.

HARROLD: I'm just about to start on the Leadership and the Teams modules this semester. I'm planning to get the students to work through some projects and activities as part of a team. But I have to say that my students are a bit sick of being put into teams in the classroom. They've all formed, normed, stormed and adjourned with one another twice already this year!

WAI SIM: Yes, same with my students. Hey, how about we get the students to form online teams across the two classes?

HARROLD: Sounds like a great idea but I don't know if all my students have access to a computer, let alone an email address. It's still not easy to get online out here, even though Westerhope is a moderately sized town, now.

WAI SIM: That's okay. We can still get them to work online at college. The colleges are linked by a network system. So although they won't be using the web for connectivity, they will be online within the network's intranet. Can you get access to the computer lab on Tuesday evenings?

HARROLD: Yes, of course. What a great idea! We can have four groups of six; three students from my class and three from yours in each team. We can give them projects that they can research together …

WAI SIM: … and they can submit one joint project per team as the final assessment task. Perhaps we can get them to keep a diary of their interactions and experiences. They can reflect on the collaborative task, identify issues and stumbling blocks, and come up with some solutions for next time.

HARROLD: You must have a bank of tasks and projects for the students developed already, I guess. I certainly do.

WAI SIM: Yes, I do. We will be able to share resources. Fantastic! Sometimes I feel as if I can't possibly think of another scenario or case study.

HARROLD: What about their contribution to the team effort? How do we measure that? How do we tell whether or not a student has just coasted?

WAI SIM: Well, perhaps we can set a progress report task. Three progress reports per semester that have to be completed by a different team member each time. Naturally, they'll have to collaborate, communicate and negotiate to gather the information for the report. This will let us judge whether or not the individuals have been taking an active part in the learning process. The final project and all the intermediary tasks can be placed on the college server so that we can comment and assess their performance as they go.

HARROLD: We'll need to run our plans past our respective college managers' desks first, but I'm sure they'll approve! So, all we need to do now is sit down together online to plan the delivery and assessment for these two modules for the semester. Brilliant!

WAI SIM: I guess that we'll have to collaborate too, to reach a joint decision about the students' work, whose tasks we'll use, planning when the assessment tasks are due and all that.

HARROLD: And we'll need to develop a set of criteria for marking the assessments, but I'm sure we'll manage!

Online peer assessment

Harrold and Wai Sim have completed their first semester of collaborative delivery and assessment. They are now planning their next two modules for delivery, the Relationships module which deals with communications issues in the workplace and safety in the workplace.

They are speaking to one another on the phone.

WAI SIM: The Relationships module just begs to be delivered online in a collaborative mode.

HARROLD: I agree. Do you think we can combine Relationships with the Workplace safety module?

WAI SIM: Actually, I think it might work really well. Do you know the students well enough to know about their workplaces? I think that we can build on the make-up of the students' own workplaces to develop some of the tasks around risk assessment and the hierarchy of control. What do you think?

HARROLD: Yes, that'd work. We only need eight different workplace scenarios and we can always substitute some of our case study examples if we don't have enough variety.

They can actually research some of the industry accident statistics online, too from the National Occupational Health and Safety database. We could set specific tasks for each of the teams to collect data and information from online and print based sources.

WAI SIM: We could set them a specific part of the *Occupational health and safety act* to research. Then they could be responsible for sharing the information with the class group. We could run through their presentations before they distribute them to check for accuracy, I suppose.

You know, we could tell each team to send their information to another team to check and comment on before the whole group sees it. Each team could then take an active part in the assessment of each group's work.

HARROLD: That means they would have to negotiate, build relationships and get their message across. We could have a competition between the teams. Each team would have to present their own work and the review of the other team's work.

WAI SIM: We'll just have to make sure it doesn't all get out of control! But I like this idea of using peer review and assessment. They'll learn how to give constructive criticism to their team mates and work colleagues.

HARROLD: And the fact that they will be researching and delivering information to one another is not just part of all the Frontline Management Inititative modules, but it'll be a great workplace and life skill.

We do have our work cut out for us, planning these two modules.

WAI SIM: But it'll be rewarding. And I suspect that the conflict they learn to deal with may be real, not just a case study! I think we will definitely need to learn good facilitation and negotiation skills here!

HARROLD: Well, there's nothing like a challenge to spice up your life, is there?

Scenario 2

Endeavour College—Marine and Seafood Industry courses

Online assessment plus challenge testing

The background

Endeavour College in the seaside town of Pacifica has developed a reputation as the Australian college to attend if you want qualifications in any industry or activity that is ocean- and seaboard-related. The college offers courses in a diverse range of subjects such as diving, aquaculture, fishing charter operations, boat building and underwater welding. Qualifications on offer include a variety of qualifications from the Seafood Industry, Marine and the National Outdoor Recreation

Training Packages. Students can also study to obtain their boat licences; merchant seamen can obtain their master's tickets.

The college has been expanding rapidly. Due to marketing activities aimed at overseas markets, a large percentage of students now come to the college from China, Africa and India.

In the initial stages of marketing, a team of representatives travelled to the targeted countries to identify opportunities and to establish relationships with overseas colleges. The colleges have enabled subsequent teams to provide potential students with print-based and practical tests before being accepted and placed by Endeavour College into a range of appropriate marine and seafood industry courses.

The issue

The down side of this testing is the strain it places on the Australian staff and Endeavour College. Whenever a team travels overseas the classes are short several teachers for whom the novelty of travel is rapidly wearing off. Also, continually sending a band of teachers to exotic destinations is costly.

The solution

During the past year, a team of developers has devised a series of online tests to assess the students' readiness for the advanced level marine industry and seafood industry courses in Australia. The tests assume a basic level English literacy and numeracy skills. They provide the applicants with a range of scenarios and case studies that require short answers. In effect, they are designed to gauge underpinning skills and knowledge related to the courses the applicants are planning to attend. They are a useful measure for the college to ensure that the students are placed in classes appropriate to their prior learning and experience. The tests are available initially at a college location but in the future will be accessible from a secure website in any environment.

The hands-on testing will take place at a participating overseas college and will be monitored by identified graduates from Endeavour College who have also attained their Certificate IV in Workplace Training and Assessment and who have up-to-date industry experience. The hands-on tests are designed to examine the applicant's ability to diagnose and repair common faults.

There was some initial concern from teachers at Endeavour about the potential for cheating if the online tests were available freely. The college acknowledged that there was indeed opportunity for the students to cheat. However, as the students will be performing hands-on monitored practical tests, those students who had not completed the online tests themselves would soon be identified.

The outcome

The initial testing went very well and the first classes of students enrolled in the Certificate IV in and Diploma of Transport and Distribution (Marine Engineering), the Diploma of the Seafood Industry (Fishing Charter Operations) and the Diploma of Transport and Distribution (Maritime Operations) are all progressing with enthusiasm.

The added benefits of the testing has meant that Endeavour College is now planning several lower-level courses at certificate III to cope with the demand from those students not yet ready for certificate IV or diploma qualifications within the Marine and Seafood Industry Training Package.

Endeavour College is enthusiastic about the outcome so far and is preparing to seek out further overseas opportunities.

Online testing with accompanying simulations

The background

Endeavour College has been delighted with the results of its online testing to date. The testing has meant that students have been placed in classes appropriate to their level of ability and prior learning. As a result, students have had a productive and challenging experience at Endeavour College. There has been a significantly high course completion rate with the majority of students gaining their qualifications.

The college is making a name for itself around Australia as the college for ocean-related industries. The marketing team realises that there is a lucrative market for Endeavour's products and services right at its back door. The team discovered that, although there is a demand for its courses, the strongest interest in Endeavour College is in the possibility of recognition for some of its courses.

The college believes that by offering recognition at a reasonable price to Australians, the college will be investing in the future. Those who wish to gain further qualifications and training will enrol at a later date. They will be more likely to go back to the college which provided great service and which has developed an enviable reputation for training.

The challenge

Recognition can often be a costly and time-consuming process. As Endeavour will be offering recognition at a relatively low price, the mechanism for assessing the candidates' skills must be efficient as well as being reliable, valid and fair.

The college identifies the initial courses to be offered for recognition using a risk management approach. A team of instructional designers and content experts work together to design a set of online guidelines for recognition assessment. They then design an online self-assessment quiz.

The online quiz is linked to specific competencies, but to make it easier for applicants, the team bundles competencies into qualification groupings. There are many philosophical discussions amongst the course development and delivery team during the design of this tool. The issues are about accessibility for the applicant and equity for all.

Initial research by Endeavour College has shown that applicants will generally be applying for the full qualification. The tool has been designed so that similar competencies within a qualification are grouped together. This means that often, one set of evidence might suffice for more than one or two competencies.

However, the qualification packaging rules are quite broad. The applicants could have any of hundreds of permutations of competencies that would make up each qualification, not to mention a proportion of competencies from completely different training packages. There is a concern that an applicant might rule themselves out of the qualification just because they could not meet one specific criteria, without realising that another competency is similarly valid.

In the end, the self-assessment online resource has become quite sophisticated. The applicant will be able to select from a set of criteria to make up the qualification. The software will process the package and create the personalised self-assessment kit.

Although costly and complex to program, the college is happy with the product. The online quiz will be available both at selected venues around the country and online within a secure website. Applicants will need to contact the college, pay their fees and obtain a password before downloading the self-assessment tool. By controlling access with a password, the college is hoping that they will be able to track applicants effectively and provide follow-up and support.

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Workplace assessors

Each applicant who selects recognition will need to either complete a face-to-face challenge test in a simulated workplace, such as in a participating college, or nominate a workplace assessor who can verify the applicant's ability and skills. Simulated assessment tasks were considered to be too expensive to develop and are also difficult to access through phone-up modems.

All assessors are required to have the Certificate IV in Workplace Training and Assessment. Workplace assessors can register on Endeavour College's website. As an alternative, Endeavour College will fund an assessor to travel to each location and be available to attend the applicant's workplace during a set period of time. This solution has the added benefit of giving the college an even higher profile within the industry nationwide.

The result

Enrolment enquiries in Endeavour's courses in distance and block delivery mode have increased exponentially. These are early days. The full benefit, if any, of this initiative will not be realised for some time. However, the increased publicity has raised the profile of the college and demands from potential overseas students have certainly increased.

The online assessment tool has also attracted publicity and there has been interest from other registered training organisations looking for customised versions to be developed to address specific qualifications on their scope of registration.

The verdict all round is positive.

Scenario 3

Living Goodness integrated self-assessment and performance reviews

Online self-assessment plus online and face-to-face training

The background

Living Goodness is a successful Australian-owned manufacturer and distributor of herbal products. The chief executive officer of Living Goodness, Tarquin Peters, believes in providing continued support and training for his employees. Tarquin has recently established a training section within the organisation with three employees, Val, Leon and Anita.

Val has performed all the necessary preliminary work to enable the organisation to become a registered training organisation. So far, Living Goodness has several qualifications from the Business Services and the Information Technology Training Packages on its scope of registration.

Leon has managed the implementation of a computer resource that records individual statements of duties against staff names and current competencies. All statements of duties are linked to training package and industry competencies.

Anita has been involved in information workshops to help all staff understand that the computerised record system is an opportunity, not a threat. The organisation is not using the system to sack staff who 'fail', but rather to give every employee the opportunity to gain qualifications and to provide a transparent career path.

The operations

Staff at the company will have the opportunity to access their statements of duties and the set of related competencies at all times. Online self-assessment is available to allow personnel to rate their own ability, skills and knowledge. There is also a facility to help employees put together an electronic portfolio to ensure that they have the necessary evidence available when they apply for recognition.

Staff are also being encouraged to discuss their career paths with Val and Anita from the education and training team. The team will identify the set of competencies these workers will need for further work opportunities. Promotions and pay rises are incentives to those who complete online and in-class training programs to achieve higher work-related qualifications.

An added benefit of the system is the linked performance management system that provides each employee with an online statement of achievement. As each person meets agreed performance standards and targets, the form can be completed automatically and relevant evidence attached.

The reality

The staff were suspicious at first. They thought that this new system was a way to dismiss workers who are not up to scratch. Tarquin has conducted a series of short discussion sessions with small numbers of staff. He has assured them that the system is there to help staff gain qualifications that they are already more than qualified for. With the help of Leon and Anita, he identified a handful of personnel who meet the competencies for the Certificate III in Business Administration. By using this group as real examples, he has demonstrated how easy the system is for staff to access and record their workplace evidence.

Formal training sessions explaining the basics of competency-based training have given staff a better understanding of the process. Hands-on training on the system itself has also taken place to show staff how to self-assess and gather sufficient evidence. Further hands-on training demonstrating access to the online training and assessment will be rolled out over time.

Tarquin is optimistic that the whole system will create a better trained workforce and will give staff a chance to get recognition for skills they already have. He also hopes that the system will ensure that performance reviews will become more regulated and less susceptible to bias.

From the company's point of view, the fact that staff can work through the process at work is a bonus.

The future

The company has recently spent money on the development of a simulated call centre. The organisation wants to add the call centre competencies to their scope. Living Goodness has some great call centre personnel who are as yet unqualified. By using the simulated call centre, they can assess their skills against the competencies and apply for recognition for specific qualifications.

Further benefits of the simulator include allowing call centre personnel to practise handling hostile calls and the company to assess the skills of new employees in a simulated environment.

Although the simulator was an expensive investment, Living Goodness believes that the money has been well spent. Staff receive essential training and can practise their techniques and skills on the simulators.

Scenario 4

A discussion about setting up online between an 'old hand' and a 'newbie'

Chris and Lorraine met recently at a national conference exploring the issue of online delivery. Lorraine works in the university sector while Chris works in a medium-sized VET sector registered training organisation.

While at the conference, Chris tells Lorraine that he is yet to try out the online experience with his students. Lorraine offers to become Chris's mentor and suggests that they meet once a month to discuss how things are going. Chris says that he needs to meet before he even begins, to make sure that his students are in no way disadvantaged by his lack of knowledge. Lorraine agrees and they meet in a quiet part of the university campus one morning.

LORRAINE: Hi Chris. When do you start with your online class?

CHRIS: Hello, Lorraine. Next semester and I'm a bit anxious, to tell the truth. How do work out whether your students can cope with the online environment?

LORRAINE: Well, you don't know for sure but the fact that they have chosen the online mode as opposed to face-to-face means that they have probably considered the options. You're delivering a face-to-face class simultaneously, aren't you? The students do need to be quite motivated and should be able to plan their time well if they are going to complete the course. They also need to have a level of competence and familiarity with computers.

CHRIS: They'll need an email address, too, won't they?

LORRAINE: Yes. We're lucky at the uni. All students are given an email address when they enrol whether they are enrolled on campus or off campus.

In my classes, I try to organise a face-to-face meeting first up for all my online students, if at all possible. I find that if the students all meet first, they are then much more likely to take part in the threaded discussions and any other discussion tasks. This is important for me and for them, as I do take into account the type and frequency of online contributions in the overall assessment of the course. Of course, I do advise them that this is a small but important factor that contributes to their overall grading.

CHRIS: Threaded discussions? That's where someone makes a comment and others can contribute by adding statements and comments for everyone to see, isn't it? How do I do that?

LORRAINE: You need to speak to your online manager to see what sort of system is being used to manage the learning at your college. Here we use WebCT and there are a whole load of support people to help with setting up chat facilities and threaded discussions. That's not all though, we're also able to add support materials, links, suggested timetables for study, assessment events and their timing and weighting, plus a rogues' gallery where the students, me and my colleagues all place their mugshots and a couple of statements about who we are and so on.

CHRIS: So you let the students know right upfront exactly what they have to do, and by when for their assessment? I guess we do the same but having ready access to the assessment tasks would be really handy, wouldn't it?

LORRAINE:	Planning for assessments is just as important for you. After a while, online students expect rapid response and detailed comments on their submitted reports. Some even send you their drafts for comments before they formally submit them. If you want to provide that sort of formative feedback, make sure all the students know it's an option and how to organise it. But you need to get some sort of ground rules about the issue of rapid response for email questions. If you don't give the students a window of time when you will respond to queries, then they'll expect replies within 24 hours no matter what day of the week it is! Also, if you have many similar queries, you might like to develop a FAQs (frequently asked questions) site so that students can scan the site first to see if anyone else has asked the same questions rather than writing to you all the time.
CHRIS:	But it is meant to be more flexible, isn't it?
LORRAINE:	Yes, but not to the point of it becoming unmanageable for you.
CHRIS:	You said earlier that the students find it easier to contribute to the discussion if they have met face to face. That makes sense, do you have any other suggestions?
LORRAINE:	If you speak to your online manager, see if there is any chance of giving your students the option of contributing with a pseudonym. Obviously, you need access to the real name/pseudonym link so you know who's who. Some people find it much easier to contribute with a different persona. For some cultures it is disrespectful to question your teacher. I find that some of my Asian students, for example, will be able to discuss issues with me in great depth if they do it under a different name.
CHRIS:	Boy, I thought online was supposed to be the easy option!
LORRAINE:	No way, it's probably more time-consuming and therefore more costly. But it's a great experience and there are some really interesting revelations on the way. See you again in a couple of weeks time?
CHRIS:	Yes, I'd appreciate that!

A discussion about collaboration and communication in online assessment

Chris's online class has begun. He organised a face-to-face meeting for all the students. Those from out of town were able to attend several TAFE campuses that allowed them to join the class by video link.

Chris wants the module to be learner-oriented and he would like to enable some interaction and online communication between those students who request it. The online courseware the college is using is an almost self-contained piece of software that allows the students to work through the study with minimal support. Although Chris believes that some people may be happy with that arrangement, he wants to build in some more collaborative assignments, some discussion and some peer assessment to suit all the learners' styles and needs. Chris also feels that he would like to be actively involved in the learning and not just as a knowledge source.

Chris thinks that he needs some early feedback to let him know if any of the students are struggling before they just drop out. He feels it is time to speak to Lorraine again.

LORRAINE: Hi Chris. You want to develop some online questions, is that right? As part of the formative assessment?

CHRIS: Hello, Lorraine. Yes, I thought some multiple-choice would be good. Students could do the quiz, make some decisions of their own about what areas of study they need to focus on and I could keep track of their performance and provide a bit of direction and some study hints.

LORRAINE: Look that's a great idea. You can even program the answers to appear right away with some explanation for wrong answers of course, and some reinforcement for right ones. But just make sure you realise just how long it takes to develop the questions and answers—and the accompanying explanations. If you had a couple of colleagues delivering the same course, you could pool resources and share the work

CHRIS: I have some multiple-choice from the last couple of years' face-to-face classes. I could use those as a starting point. Then, I guess, I can add to the data bank each year. I will speak to my colleagues, too.

LORRAINE: Do you have any support from your college?

CHRIS: Oh yes. We're trialling a new learning platform at the moment so I have become part of the trial. They monitor all the things I have difficulty with and will use the information as the basis for a manual. I'm not sure if I should be flattered or offended, but at least I have support!

So far, I have set up a FAQs page and there is an area for threaded discussions. Plus, the students can see the suggested study plan, the assessment tasks for the semester and can chat informally to one another in a chat space.

I've also got a resource page where I put readings and such. Some of the students have added to that already. I have also made it clear that each student must contribute to the threaded discussion based on an area of the course. We're in the process of negotiating how these contributions to the threaded discussion should be assessed.

LORRAINE: Are you going to use the contributions to the discussion topics as part of the summative assessments?

CHRIS: I decided that 10% of the overall mark for the semester should be for contributing to the threaded discussions. It actually caused me some anguish, thinking about the appropriateness of assessing the online discussions. We have to prepare our courses to map against units of competency. Some of my colleagues suggested that contributing to threaded discussions was not a valid assessment criteria.

After some debate, I realised that the evidence guides within the competencies stated that communication should be performed through a range of mediums and technologies including by phone, email and fax, so it fits in there as well.

LORRAINE: I usually place about 20% to 25% of the overall mark on the discussion but perhaps 10% would be more appropriate for the VET sector. I'm examining a completely different set of skills and knowledge.

It's great for the students, being able to contribute online. By taking part in the discussions, students keep up to date with the subject, do the readings and draw some conclusions of their own.

You know, you could make use of the online environment by setting several problems that are open-ended. Rather than the students working individually, they could try to solve the problems as a team. Each student could use their knowledge of a particular facet of the problem to help build the answer or solution. It takes a while to set this up but it's a good way of assessing their team skills

What do you think of that?

CHRIS: I like the idea. Actually, they could examine regular issues throughout the course, couldn't they? How about I set a question for teams to respond to online. Then each team posts their response and everyone else comments, adds, and refutes it and so on. This also addresses some of those important key competencies.

I'll have to work out how I assess it and then make sure the students know what criteria I'll be using to assess them. Now that they're more used to working online it should be okay, but if I'd tried it at the beginning of the course, I think they might've found it too hard and a bit intimidating.

LORRAINE: About the assessment, ask the students how they think it should be marked. How much for the initial response and how much for the critiques.

CHRIS: That sounds good. They'll get a lot more out of this than they probably think they will.

LORRAINE: Keep me posted, won't you?

CHRIS: Of course, and thanks!

Scenario 5

Web design in the classroom—an interview

This is a transcript of an interview that took place between Brad, an information technology teacher at a small specialist information technology college in a major city and Fiona, a post-graduate education student at the local university. Fiona is writing a comparative piece about online assessment strategies for the student journal ***Palimpsest***.

FIONA: What are you teaching that has got you excited?

BRAD: I have a class at the moment, mostly young kids just out of school. We're doing a web layout and design course. And naturally, the subject just has to be assessed online. They put their webs on the college secure site, learn how to upload and all that, and then they all have an opportunity to critically evaluate each other's work.

Actually, I make sure that they each develop a set of criteria first to judge the work. We talk about the criteria and decide whether one set fits all. That naturally leads on to looking at different webs for different purposes and we discuss that together.

FIONA: Do your students work from home?

BRAD: Yes, but really only as an adjunct to being in class. These students are, as I said, just out of school. They enjoy the campus environment. They come here and get to know one another, go out together and all that. Also, being young, they haven't necessarily got the resources at home that they have access to here.

When they're all fired up with their web designs, it's hard work getting them to actually log off and go home!

FIONA: So they just use the web environment for their web designs?

BRAD: Oh good heavens, no. We have a journal, or rather, they have to design an online journal. I give each student an aspect of the theory to research and they put their finished product in the online journal. Of course, I get them to email me the draft first to make sure that they haven't left anything out, their facts are right and they've covered all the issues.

In fact, if there's a part of the design and development story that hasn't been covered, I add my own chapter to their journal. And boy, they are really critical of my work! But, you know, you have to let them have their say. I'm big enough and ugly enough to take it all anyway.

I love teaching these classes, you know. When I think about it, I'm not really a teacher at all. I'm more their mentor; I keep it happening. I learn so much from them, too, you know.

FIONA: Do you worry about plagiarism or cheating?

BRAD: No, I don't. Look around you. Sally, over there, is not very comfortable with HTML. Gary, who just loves to help people, is working with her now. She's learning from him and in the end, her web will be great. Is that cheating? I don't think so, it's just part of learning.

Adrian, he's a whiz with interactivity, but real subtle stuff, you know? As far as I know, he's barely written a single line of JavaScript but his webs are full of it. That's what web design is about, in part. You see something you really like in another web and you copy the code. Or you go to one of the shareware sites and download stuff. Is that plagiarism? I don't know. It's just real life.

And Dave, over there, wants to learn Flash. He's used the Macromedia tutorial but has just discovered that Pip has been programming in Flash for the past semester. He's cornered Pip and bribed her with the promise of comprehensive Illustrator instruction for her work. Dave now has more Flash functionality on his site than anyone else, including Pip. Still, the other students may well be critical of a completely Flashed out site.

You see, Samantha and Jon are working on their web layouts together. Their webs will be similar, but look at what they've learnt from each other.

FIONA: What about collaborative assessment?

BRAD: Almost everything they do here is collaborative. And, you know, when you're out there in the real world, that's how it happens. You share, you ask for help, you advise others. And I tell you what else you have to be able to do, criticise without giving offence or alienating your team mates. When the students pull apart each other's work, they learn how to be careful about how they say what they need to say.

FIONA: Do you set real tasks as assignments?

BRAD: We are really lucky here. We must be surrounded by a hundred businesses—shops of all kinds, accountancies, a TAB, an employment agency, a club, a modelling agency. They even say there's a brothel but I don't know where.

Each semester, I do the rounds of the businesses and find four likely candidates for a new website. Then, all my student teams do the work. They learn to plan, interview, write up design briefs, develop prototypes, negotiate with clients ... The clients sometimes get scripts from me to ensure that each group of students gets challenged by some unexpected twist to deal with. But, you know, they produce some brilliant work. A few of the companies have taken the students work to the professional web designers they'd paid a fortune for and said, Amateurs can do better than you! ... I'm not sure that's always a tactful approach, but, it's great that students get 'real life' tasks to work on.

FIONA: Do you offer fully online delivery options for the course?

BRAD: Yes, I do. The take-up is usually from older people, you know, people with families, jobs, responsibilities and the like. I still get them to work collaboratively, only it's all online. I reckon it's harder for them, you know, just judging by the emails and sometimes the despair as the term draws to a close and they've only finished half the work. They have their own journal to contribute to, as well.

You can prompt and give a schedule for them to follow, but the reality is that their work and home life takes precedence. It's harder, for sure. There's so much sharing in the classroom that you can't quite simulate with threaded discussions, chat sessions and online review of each other's work.

You have to provide as rich an environment as possible online. And of course, you give times to phone for those who really need to hear a voice once in a while. It takes time and lots of work to establish the relationships with the online students, but it is worthwhile.

FIONA: How do you judge your students?

BRAD: Look, when they leave here, they might all have the qualification but they're by no means equal. They will have met the criteria outlined in the competencies. I tell you what, the real measure is how much each student has learnt in the class and how they can use that in the workplace when they leave.

Bernie, over there, he was a complete novice. I really don't know who let him enrol. Knew nothing but he has probably learnt the most. Not technically perfect by any means, but, boy, does he have a natural intuition. He knows exactly what the client wants. He'll be a truly valuable member of a team in the future.

Hélène, she came here with programming skills and some networking knowledge. Yes, she produces technically brilliant work, can't fault her. But she has little patience with her clients. Of course, she'll also be an invaluable team member but for completely different reasons.

How can you use one set of criteria to judge your students? You've got to know them well, assess what they start with, then follow each student's progress and record it, and then see what they end up with. Thankfully, the competencies actually allow for variation, so it all works well here for me.

FIONA: Have you anything else you'd like to add?

BRAD: Yeah. Have fun in class and use tools that are appropriate to your subject matter. And never, ever stop learning!

FIONA: Thanks, Brad.

Scenario 6

The diary I kept while learning at a distance—a learner's perspective

Prue is a 35-year-old mother of two. She lives on a property 350 km away from the nearest town. The property runs beef cattle, various feedstock, and durum wheat. Prue and her husband would like to diversify and are thinking about tea tree, lemon-scented myrtle, Dorrigo pepper and buckwheat and soy beans. Prue has decided that they need to know more before they make any decisions. Prue's husband is currently investigating the buckwheat and soy bean opportunities. Prue has enrolled in an online horticulture course for the next semester.

This is her diary.

Week 1

Well, I've finally enrolled. It shouldn't be too hard, only three subjects; Native plant soil preparation and irrigation, Native plant care and pest control and Native plant harvesting. We have a satellite dish on the farm, so picking up the materials shouldn't be too hard. Just as a back-up, the college has sent out a copy of the course materials on CD. I'll still have to access the assessments online. The college says that I can try to take part in the chat sessions but the satellite connection might make the experience slow and frustrating. If I have problems, Bill, the facilitator, will send me a complete copy by email afterwards.

Bill has told me to make sure that I email once a week before Thursday afternoon to report my progress and to ask questions. He said that there were tasks to complete right from day 1. Many of the tasks are apparently just to keep me on track and to let me see that I'm learning as I go. There's a record of which tasks count as part of the final assessment and how I'll be judged.

Week 2

We have to keep a production diary online as part of the final assessment. I've been preparing the soil in the garden for planting. I've been using the diagnostic tests and mixing additives in formulas suggested in the resource for my chosen plants.

I can see that the production diary will be a really useful reference for us if we do go into production later next year.

Week 3

I've got a very small plot of land near the house that I can practise with—the soil is most suitable there and well prepared. We've bought 2 lemon-scented myrtles and 5 tea trees. It seems silly, such a small amount, but I need to try out what I'm learning. So far, I've had some spare time and have actually started week five of the course already. I've been sending emails to Bill to let him know where I'm up to.

I've been doing the online quizzes to check my own understanding. It's interesting. Sometimes you really think that you've got the idea, but then the quiz shows you you're quite wrong! The quiz is good though. Right or wrong, there is always a box that pops up explaining the right answer and directing you to new websites or new chunks of information that have just been posted. When we feel we're ready, we complete a short online assessment that goes straight to Bill. This is so he can watch how we go and provide help where we need it.

Bill has put a journal online that the whole group can contribute to. He's given us some little tasks to help us each prepare an online article. Plus, he has designed an 'Ask Bill' section where he publishes some of our questions and explains the answer in detail. That's a great resource. Even when you don't have a question yourself, it's a good spot to get more information from. Last week, one of the students found a collection of hairy caterpillars on his lemon myrtle. Bill had the remedy. Today I found a similar collection of hairy caterpillars that I knew how to deal with straight away.

Week 6

I've just had a bit of a setback. My 4-year-old took ill and I've really had to spend my time nursing her back to health. Then my 6-year-old felt left out of it—he wasn't getting any attention so he decided to be particularly difficult for what seemed like forever.

Anyway, I'm glad I did that extra work when I could. I've just got to the reading for week 6.

Two weeks ago, Bill set up a listserv. I didn't know what that was, but it's like a community talk space where we email out and everyone in the class gets a copy. It's just made up of the community of our class. It's really good. It's an easy way for us to share our ideas and map out our progress. Bill set up a listserv because apparently, most of us would have problems with bandwidth if we tried to join a chat room.

We've all introduced ourselves to the group online. One of the students, Teng, has been growing Asian vegetables for the city markets for years. He now has 2 acres under riberries and native bush tomatoes. He's hoping to sell the fruits back to Asia through his contacts in Vietnam. Good on him! And Sharon and Jimmy have planted quandong and are hoping for similar export opportunities, to Japan.

Week 7

This is a tricky week. We've been studying some of the diseases and bug infestations that can worry the native plant industry. When you cultivate natives, they can get a bit stressed and tend to be more susceptible to things that wouldn't normally worry them. We have been given a couple of multiple-choice quizzes to do so that we can check our knowledge of diseases and infestations, remedies and treatments. When you have whole lists of bugs and remedies to pick from, you kind of get confused and forget what you learnt. I think I prefer quizzes where you write your answers from scratch!

The online journal is interesting. We'll get marks for our contributions. Each week, Bill gives us some suggested topics to explore. He suggests that we send a minimum of two articles each for publication throughout the semester. We send articles, stories, diagrams, plans, drawings and even photos to Bill and he puts them into pages in the online journal. We don't have to stick to the topics, though. If we write about an area of interest to us all, he'll publish it. There are some great stories there already and Bill has contributed a few himself. At the end of the course, he says that he will make us all a CD with the journal on it to keep.

Teng was a bit worried about his literary skills and his ability to write articles for a journal, English isn't his first language. Bill's explained that this course isn't about writing magazine articles. He says that if we're not comfortable with the articles, we can send the information in dot points, we can mail photos or diagrams and we can use graphs and charts. He'll prepare the articles so that the information is clear and phone or email us to check that we understand the facts. Teng has already sent Bill a copy of a newspaper article from Ho Chi Minh City about the benefits of tea tree oil with a rough translation which Bill has published!

Week 8

We've just been set our big assessment task. It's only half-way through the course but Bill says that it's a step-by-step collaborative task. On the listserv, he told us what the project was and said that we could each elect to complete a specific section, then send it round for comments, make any changes if necessary, then we pass it to the next person or group to complete the next section.

The task involves the planning and setting up of a native nursery. There is a plan of the site, with contours; an analysis of the soil; the typical rainfall and temperature patterns for the area. We are having a discussion on the listserv about what plants we should 'buy'. Apparently, as we proceed, Bill throws in all sorts of problems that we have to discuss and deal with.

Week 10

The online listserv, that's us, has elected Warrigal greens to grow in the wetter parts of the land, quandongs and finger limes up on the drier area. We have a large area dedicated to tea tree. Then there's a section for a stand of eucalyptus macrocarpus. They're for gum nuts for the cut-flower markets. It's not a viable mix, we know, but it gives us all the chance to contribute our knowledge one way or another.

Next week most of us will be too busy with harvest to really take part in the class. Bill has advised us to do what we can and that we are ahead with the study anyway. Sounds like he's had to deal with the harvest issue before and thank goodness he's flexible!

Week 13

Well, we're all exhausted but ready to proceed. Jack and Suellen have prepared the soil on the test acres and marked off on the map where each species will be planted. We've all had a good look. I thought it was fine but there has been discussion about the soil in one corner of the site. Some people thought it would be too rich. Eventually, we asked Bill to provide advice, as we'd become 'stuck'. Bill laid out all the factors that we should take into account and we realised that in a way, both parties were right.

The listserv is currently debating the work Marco and Brian have done on irrigation. It's certainly been an animated discussion. Bill has suggested that Brian and Marco have spent most of the budget. He wants them to think about other costs that will come later.

Week 14

I've discovered a soul mate not 150 km away, Martha. She and her husband diversified several years ago and are producing goat meat. We decided to complete our part of the assessment together. I think it'll be one of the pest invasion episodes!

Tamsin and Arthur are tackling a sooty mould on the warrigal greens and an unknown borer on the quandong at the moment. Naturally, there are several solutions to both problems. Tamsin and Arthur have to discuss why they chose their answer and what are the benefits and drawbacks of each decision are. Cost, of course, will also have to be taken into account.

I've been reading about the harvest. Too early here, but there are a heap of factors to plan before the actual harvest takes place. Finding distributors or processors, arranging transport, assessing the weather, planning labour. I'm sure this would all be sixth sense for my husband but I'm just glad there are short assignments throughout the course that I have to complete to help reinforce ideas. Bill's responding more and more on the 'Ask Bill' page. I guess that means I'm not alone in the 'slightly overwhelmed' stakes!

Week 15

Martha and I have to deal with possums devouring all the finger limes, bats in the quandongs and cockatoos in the macrocarpus! Great! And the listserv is not helping. Brian suggests the .22 for all native wildlife!

Meanwhile, I've been using the lemon myrtle leaves in all sorts of food, Thai stir-fries, curries, pumpkin soup and custards.

Week 16

The course is nearly over. I've been filling in my production diary for submission. I've had a few bugs on the leaves and in the soil which I have managed to deal with, I hope. I have even done all the work on harvest issues, not that my plants are anywhere near that stage. I know where the nearest tea tree distillers are and have found a distribution outlet for my lemon myrtle.

Actually, we all shared some of that information to help Milena, Austin and Teng prepare their part of the assignment, the pre-harvest preparation.

Week 17

Sharon and Jimmy have just competed the harvest part of the assignment. Now we all have just one more opportunity to comment and suggest changes. Marco thought that we should have chosen something other than Warrigal greens for planting, but he was joking, I think!

I've just completed the post-harvest plant care reading. My final short quiz results will be sent in soon and my diary will also go. Next week, we are going to try to send comments to the listserv together. Some of us are talking about doing the propagation and marketing course next semester.

Week 18

It's over! Well I've made online friends and enjoyed myself. Bill and his comments have kept us all going. The diary and the journal will really be useful if we go into production in the next year or so. And, of course, I couldn't have done this if it hadn't been online. And yes, we all got through the course!

Thanks Bill!

Scenario 7

Classroom strategies for assessment are transferable to online—A learner's perspective

Gilliansberg Institute is a registered training organisation undergoing change. The board has recently appointed two new board members who are keen to see the institute enter the twenty-first century. James Pellecanos has just been appointed the new chief executive officer. He is young and enthusiastic and anxious to make use of the online learning facilities the institute bought last year. He knows that there are some keen young people in the staff who would love to offer online options for clients. He also knows that the client base does not want the institute to abandon its face-to-face delivery altogether.

At a recent staff talk, James talked enthusiastically about the learning management system, Blackboard, that was available to teachers to learn and use as an adjunct to any online delivery suggestions. He even hinted that pay rises were forthcoming for those who had a project they were prepared to develop for online delivery and assessment.

Later

Margo is 26 and has just finished an online masters degree. She has loads of ideas and wants to work out a plan to present to the chief executive officer. She believes that the course for paralegals (Certificate IV in Business [Legal Services]) could be adapted for online delivery. The take-up rate would be good and many of the print-based materials could be converted to portable document format for access online.

Dominic is in his early 50s. He's a fantastic teacher with both practical experience and a thirst for knowledge that means that he reads profusely and constantly provides a challenge for his students. He's also fed up.

'I've been giving this college my soul for the last five years. I feel like I'm already on the heap because I have no knowledge or interest in this internet and online stuff. I always believed that students would want face-to-face interaction, instant feedback and the fire of a good debate that can only happen in the classroom. And as for Blackboard, in my day a blackboard was for writing on with chalk. Maybe I should just resign now.'

Margo is shocked.

'You've always been my hero, my mentor. You have given me so much advice and solid information over the past two years that I simply can't let you say these things. Look, just because a project is online doesn't mean that it won't adhere to sound educational principles. You have so much to offer here. Honestly!'

'How? How can I help? I feel like I know nothing of this new order', Dominic rages.

'Okay', says Margo, 'I want you to help me with my project. Do you agree? And you'd better say yes! I will show you how Blackboard can work for you and how useful the internet is. I can set up an email account and introduce you to chat rooms. For heaven's sake, you will still be able interact with your students, provide advice, be caustic and throw provocative statements around. The only thing you can't do is stomp around the classroom acting like some eccentric public school headmaster from Tom Brown's Schooldays!'

'Enough! Okay, I'll help. And don't you dare accuse me of being stubborn!'

The first development session

Margo wants to offer some face-to-face interaction throughout the course but wants to use the online environment to enable her students to communicate online at all times. The course Margo is delivering is at Australian Qualifications Framework level 4. She is delivering four modules in the first part of the course. The chosen modules deal with skills, such as communicating information, judging what information can and cannot be released to specific people, finding and researching information, questioning police for details, consulting and briefing legal practitioners and preparing written briefings. Margo believes that the online medium will enhance the learning experience for her students and is keen to start planning.

Dominic joins Margo in her office to help with the course design.

'So, you want to set up some collaborative task on the computer? Why don't you just get the students to form groups that research together and share information through seminars?' asks Dominic.

'Because, my students are mostly part-time learners with full-time jobs. They never seem to be able to research in teams at times they all favour. I want to make the task more manageable for them. By using the Blackboard tool, the students can research when they can, place their findings in a shared environment, make comments and changes they all can see and prepare the material together. All this at times and places that they choose. How good is that?'

'Yes, but how do you know who's contributing what? How can you identify the slacker in the group?' asks the ever-sceptical Dominic.

'Dominic, that's always a bit of an issue, isn't it? What do you do with your face-to-face students when they complete a joint assignment?' retorts Margo.

'Well, I get to know my students from the classroom, you can't do that on a computer. And then I get them to provide a diary of their research, findings, conclusions and a quick run through of what they think they have learned—in point form, or with illustrations, diagrams, with letters from their workplace and all that', replies Dominic smugly.

'The term is 'online', you Luddite! But, you know, if your students are sending you information and contributing in online discussions, or threaded discussions, you do get to know what your students are capable of. And there's no reason why they can't complete an online portfolio that they submit at the end of the year. They can use their portfolios later as proof of their skills and capability when they go for interviews. They can even put written reports from their colleagues into their portfolios by getting a soft copy or just by scanning anything that's handwritten', explains Margo. 'But I would like some help with the design of multiple-choice tests so that they can monitor what they are learning and focus on areas that need a bit of work. Will you help?'

'Multiple-choice! What on earth do you want to use multiple choice for? You would never use multiple-choice in a face-to-face situation, would you? Your subject matter does not lend itself to multiple-choice at all. What are you going to ask? When you brief the legal practitioner should you a) be clear and concise b) be detailed and factual c) be well-prepared and accurate d) be all of the above?' mocks Dominic.

'Well, multiple-choice is effective online because learners can access it when they want and they can get instant feedback. Of course, it will take us quite some time to develop detailed responses to help steer them in the right direction when they're wrong and to reinforce their learning when they're right.'

'Margo, you're letting the tail wag the dog! You're shamelessly using technology for technology's sake. You know that multiple-choice is not a suitable assessment method for your course but you're allowing yourself to be dazzled by the tools. Why don't you think about what skills your learners need to develop and design some formative assessment strategies to complement those?'

'As much as I hate to admit this, I think you're probably right. See, you are still useful after all!' Margo grins.

'Thanks, I think!'

The second development session

The course is coming on. Margo is just concentrating on the original four modules which she has identified as most appropriate for the online environment.

The class will meet face to face once a fortnight to allow for viewing of trigger videos followed by discussions, visits by guest speakers, half an hour of face-to-face meeting between the team members and as a chance for Margo to catch up with the class in person to deal with any educational, technological or other issues that students have.

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The online component of these modules has some structured discussions based on a range of topics that all students will have to contribute to. Margo has worked hard to define the assessment criteria for the online discussions and has developed a grid to enable students to see how they will be assessed. These marks will contribute to 20% of the overall mark; the grid closely links the expected performance within the online discussion to the performance criteria of the selected modules.

Teams will work on an identified set of issues that will require individual research and team collaboration and review skills to be developed in order to produce the final product. Each team will then display their product on Blackboard for the whole class to review and comment upon. As a supplementary exercise, each group will give a short face-to-face presentation as if briefing a legal practitioner.

What Margo would also like is a short online role play to allow the learners to step into the shoes of the legal practitioner, the police, the legal clerk, and the client. She asks Dominic for his help.

'I've been trying out the email account you opened for me and I've spent some time on the internet. There's a heap of junk out there, I must say, but those references to the online journals were really good, even if some of the articles are a bit technical for me.'

'Dominic, I'm impressed! What has got into you?' Margo laughs, 'You'll be offering all your course online next!'

'I wouldn't go that far, but, your course is coming on, Margo, isn't it? So, what's next?'

'I thought a role play or simulation would be really useful. You know, the students could get into the role of a critical person in their day-to-day interactions and play out some dramas of some sort. What do you think?' asks Margo.

'And why is online good for this?' queries Dominic.

'So that people can contribute when they feel they have the time, of course.'

'I have a role play, you know. In the face-to-face class, it lasts about three hours and you have to run three separate role-plays to incorporate all the students. Each role play has two observers who write up a critical report at the end. Then there is a group debriefing where all parties let go of their roles and the feelings and emotions they have generated whilst there. We can look at my role play as a starting point for the development of yours if you like', Dominic suggests.

'That sounds good. Some of the literature describing online role plays suggests that teams of students take on one role. I'm thinking that the students have already done a fair amount of teamwork and that they need a chance to contribute as individuals.'

'Good point.'

'Also, I think I'd like them to join a role play that reflects their own workplace. Do you suppose we could develop separate scenarios to fit the criminal, commercial, family and property law fields?' asks Margo.

'Hmm. I think that there might be a load of development needed to set up the interactions, roles, plot and all the bits and pieces of the story. But I think it would prove to be useful. We can also think of some extra roles for some of the areas, like a social worker or a ...'

'Hey, that's a good idea. And of course the scenarios will be really specific. I guess we will need to script a series of things that need to happen in each case. They might take some work, though', says a bewildered Margo.

'Margo, we can try out some of the role plays in a face-to-face class first, if you like. Let's use my higher-level class to trial the role plays. They're so full of anecdotes from their own workplaces that you'll be able to build really rich role plays.'

'But how will I be able to incorporate them in to my class?' asks Margo.

'Leave the role plays till the later part of the semester and that way we'll have at least two ready to go. Look, I know you want to run with the online assessments and activities as soon as possible, but sometimes it's okay to take a bit of extra time. This way, the product you deliver will be much better. And I'm sure the students wouldn't mind if you had to run some of the course in class.'

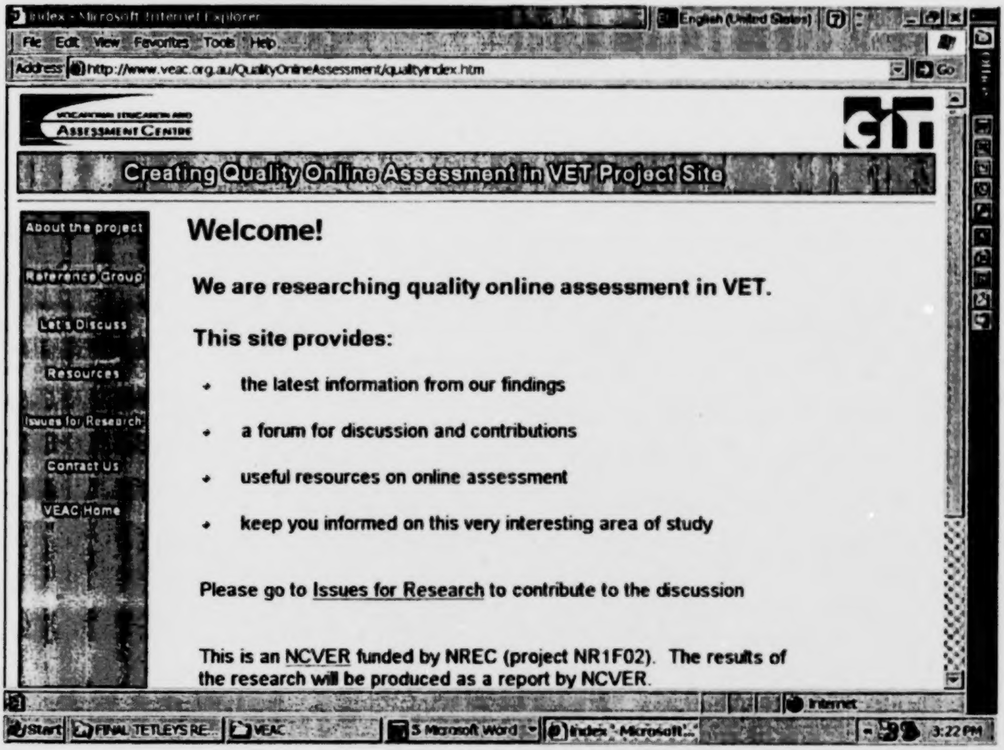
'Thanks, Dominic. You are sensible, aren't you?'

'Well of course I am. I am imbued with the wisdom of Solomon and I've been teaching a lot longer than you, you know. Now, how can I develop some little online event to show the chief executive officer how with it I really am?'

'Dominic, I have some great plans for your course. Just have a look at this idea I have here ...'

Appendix 4
Project website

Although the original project website has been dismantled, the content has been placed in the VEAC website on public view. The URL for the home page (illustrated below) is <http://www.veac.org.au/QualityOnlineAssessment/qualityindex.htm>.


index - Microsoft Internet Explorer
English (United States)
File
Edit
View
Favorites
Tools
Help
Address
http://www.veac.org.au/QualityOnlineAssessment/qualityindex.htm
Go
Assessment Centre
CTi
Creating Quality Online Assessment in VET Project Site
About the project
Reference Group
Let's Discuss
Resources
Issues for Research
Contact Us
VEAC Home
Internet
Start
FINAL TETLEYS RE...
VEAC
5 Microsoft Word
index - Microsoft...
3:22 PM

Welcome!

We are researching quality online assessment in VET.

This site provides:

- the latest information from our findings
- a forum for discussion and contributions
- useful resources on online assessment
- keep you informed on this very interesting area of study

Please go to Issues for Research to contribute to the discussion

This is an NCVER funded by NREC (project NR1F02). The results of the research will be produced as a report by NCVER.

Scrolling through the pages will reveal the membership of the reference group, the questions posed to some of the respondents and the initial controversial icebreaker statement delivered by Yoni Ryan. The statement appears below.

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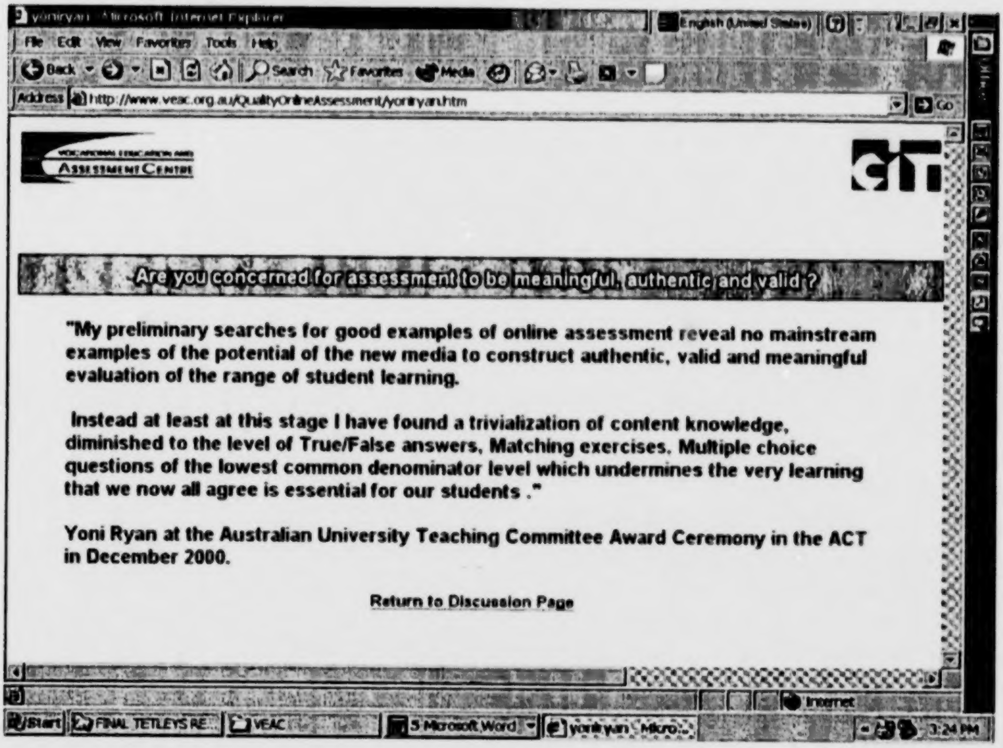

yoniryan - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://www.veac.org.au/QualityOnlineAssessment/yoniryan.htm
Go
Assessment Centre
Internet
Start FINAL TETLEYS RE VEAC 5 Microsoft Word yoniryan - Micro... 3:24 PM

Are you concerned for assessment to be meaningful, authentic and valid ?

"My preliminary searches for good examples of online assessment reveal no mainstream examples of the potential of the new media to construct authentic, valid and meaningful evaluation of the range of student learning.

Instead at least at this stage I have found a trivialization of content knowledge, diminished to the level of True/False answers, Matching exercises, Multiple choice questions of the lowest common denominator level which undermines the very learning that we now all agree is essential for our students ."

Yoni Ryan at the Australian University Teaching Committee Award Ceremony in the ACT in December 2000.

Return to Discussion Page

Although the web is still available to be viewed, any further information and responses to the online questions sent via the webmaster will no longer be acknowledged.

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Appendix 5
Interview respondents

Barnett, Stewart	University of Sydney
Barry, Sarah	Qantm Australia CMC Pty Ltd
Batten, Jennifer	TAFE NSW
Beech, Bradley	Central Gippsland Institute of TAFE, Victoria
Bell, Guy Kemshal	TAFE NSW
Bennett, Randy E	Educational Testing Service, United States
Binnick, Rita	TAFE South Australia
Bishop, Rosemary	Interdependent Solutions, Sydney
Blecich, Carol-Anne	TAFE NSW
Bostock, Stephen	Keele University, United Kingdom
Boud, David	University of Technology Sydney
Butler, Lucia	South West Institute of TAFE, Victoria
Campbell, Nola	University of Waikato, New Zealand
Cashion, Joan	Swinburne University of Technology, Victoria
Christie, Michael	Chalmers University of Technology, Sweden
Clark, Terry	Learning Network Queensland
Crosby, Brett	TMP Worldwide Australia
Dalziel, James	Web MCQ and University of Sydney
Danson, Myles	Loughborough University, United Kingdom
Donan, Peter	University of Canberra, Australian Capital Territory
Evans, Val	TAFE NSW
Gear, Keith	NSW Fire Brigade
Grady, Jock	TAFE NSW
Hall, Gerald	Australian Catholic University
Hensley, Donna	TAFE NSW
Herrington, Tony	Edith Cowan University, Western Australia
Higgson, Carol	University of Bradford, United Kingdom
James, Richard	University of Melbourne, Victoria
Jones, Louise	TAFE NSW
Khabbaz, Dianna	TAFE NSW
Kibby, Marj	University of Newcastle, New South Wales
Lees, Penny	TAFE NSW
Love, Fiona	Australian Rail Training
Luca, Joe	Edith Cowan University Western Australia
Macdonald, Janet	Open University, United Kingdom
Maley, Moira	University of Western Australia
McCabe, Michael	University of Portsmouth, United Kingdom
McNamara, Dennis	Securities Institute, Sydney
McNicoll, Cathy	Canberra Institute of Technology, Australian Capital Territory
Murray, Josephine	Pelion Consulting Tasmania
Neeland, Scott	International Hotel Management School, Sydney
Newton, Ian	TAFE NSW

Northcote, Maria	Edith Cowan University, Western Australia
O'Reilly, Meg	Southern Cross University, New South Wales
Parashar, Archana	Macquarie University, New South Wales
Peat, Mary	University of Sydney
Phillip, Robyn	Macquarie University, New South Wales
Postle, Glen	University of Southern Queensland, Queensland
Tyrell, Anthony	CentreLink Virtual College, Australian Capital Territory
Velan, Gary	University of New South Wales
Vincent, Andrew	Macquarie University, New South Wales
Way, Steve	TAFE NSW
Webb, Greg	TAFE NSW
Webb, Kate	TAFE NSW
Williams, Jeremy	Brisbane Graduate School of Business
Whittington, Dave	University of Glasgow, Scotland

NCVER

The National Centre for Vocational Education Research is Australia's primary research and development organisation in the field of vocational education and training.

NCVER undertakes and manages research programs and monitors the performance of Australia's training system.

NCVER provides a range of information aimed at improving the quality of training at all levels.

ISBN 1 74096 156 0 web edition

U.S. Department of Education
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EFF-089 (3/2000)